⚠ Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001(standards for quality assurance management systems)

ISO 14001 JACO EC97J1113 UKAS ENVIRONMENTAL MANAGEMENT 051

ISO 9001 BUREAU VERITAS Certification UKAS QUALITY MANAGEMENT 008

eco Changes for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

MITSUBISHI ELECTRIC CORPORATION

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MITSUBISHI ELECTRIC

Changes for the Better

for a greener tomorrow eco Changes

Magnetic Contactors and Magnetic Starters

Exceed your expectations

Mitsubishi's Magnetic Contactors and Magnetic Starters, continuously pushing the boundaries.



MS-T Series

Mitsubishi Magnetic Contactors and Magnetic Starters

Mitsubishi's Magnetic Contactors and Magnetic Starters continue to push the boundaries.

Mitsubishi Electric began making Magnetic Contactors and Magnetic Starters in 1933 with the first EC Series products. Since then consecutive new products and series have been highly appreciated by our customers. Our commitment to our customers remains to continuously develop our products to exceed their expectations.



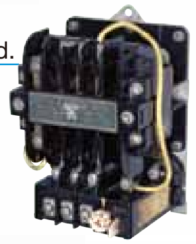
1933 1953 1960 1963 1968 1976 1982 1984 1994 2001 2002 2004 2012 2013

- 1933: EC Series was released.
- 1953: EK Series was released.
- 1960: ES Series was released.
- 1963: EM Series was released.
- 1968: MS Series was released.
- 1976: MS-A Series was released.
- 1982: MS-K Series was released.
- 1984: US-K Series was released.
- 1994: MS-N Series was released.
- 2001: SD-Q Series was released.
- 2002: US-H Series was released.
- 2004: US-N Series was released. Sales of Magnetic Starters exceeded 100 million units.
- 2012: **MS-T Series is released.** The Motor Circuit Breaker was released.
- 2013: ***The 80th anniversary***



MS-A Series
Double ratings of AC3 grade (Green) and AC4 grade (Red) were adopted allowing the unit to be downsized.





EM Series
Mitsubishi Electric introduced its own design of horizontal movement Magnetic Contactor with the EM series.



EK Series
In cooperation with Westinghouse Electric Corporation, the clapper type EK Magnetic Contactor was developed.



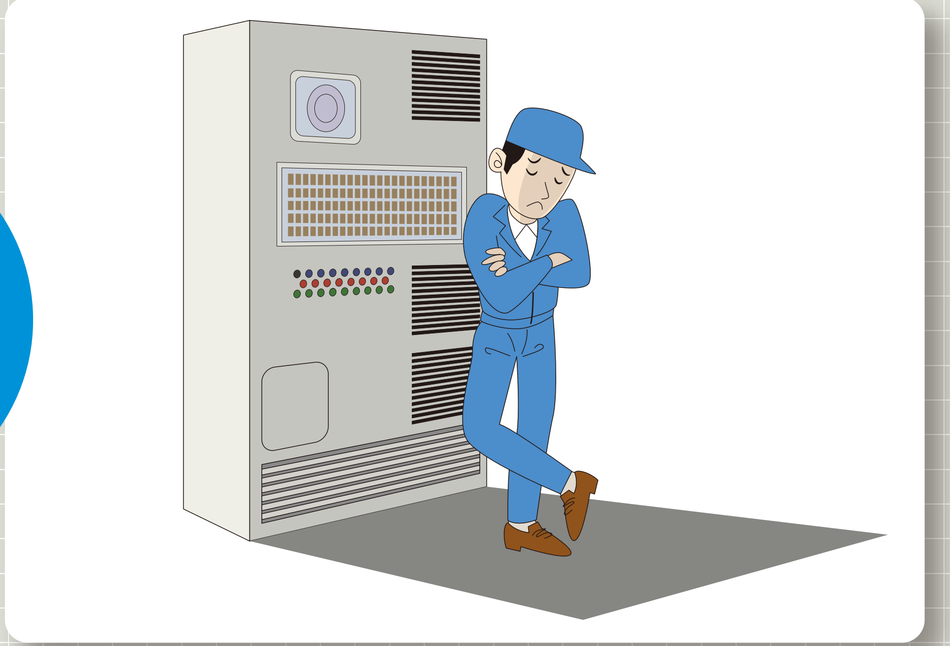
MS-K Series
Lower power consumption was achieved through the use of AC operating, DC excited electromagnets.



MS-N Series
The ground breaking "CAN terminal" proved to be an epoch making step in the design of Magnetic Contactors.



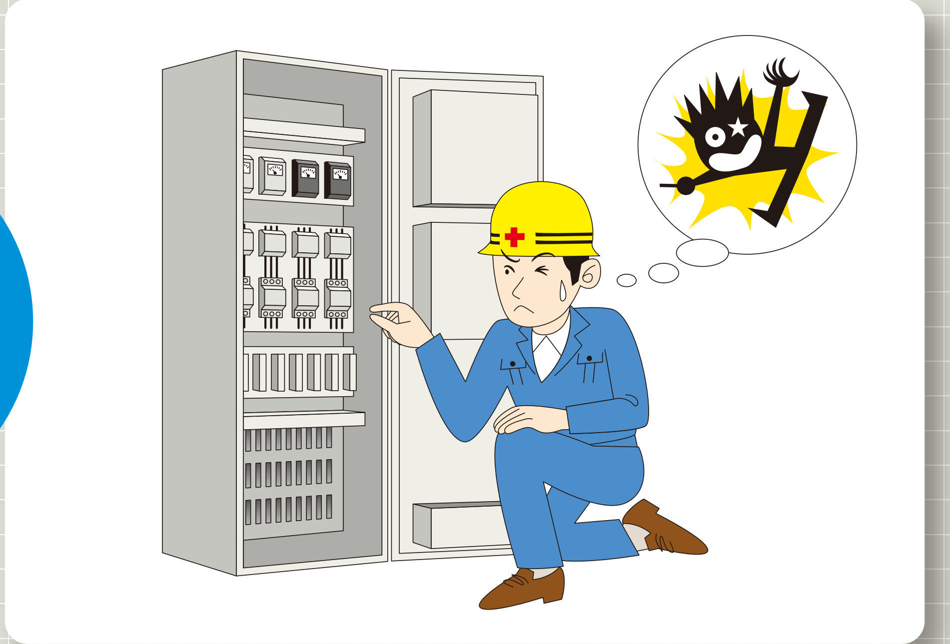
Desire to down-size the switchboard



Desire to reduce the types and stock of switchboard parts



Desire to prevent accidents such as electric shock



Do these requirements sound familiar?

The new MS-T Series can help you solve these issues.



Down-sizing
Small

Standardization
Standardization

Safety & Quality
Safety & Quality

Smart wiring
Smart Wiring

Global Standard
Global **S**tandard

Down-sizing Small

10A frame model is over 16% smaller with a width of just 36mm!!

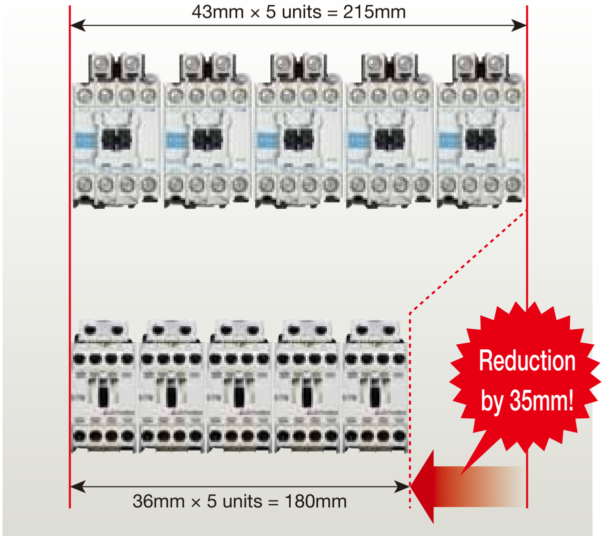
There is a saying that "every bit helps" and now with the industries smallest* general purpose Magnetic Contactor in its class, customers are able to more easily down-size their boards than ever before.

*based on a survey of 10A frame class Magnetic Contactors conducted for Mitsubishi Electric September 2012

Actual size



Example: Status where 5 units are arranged



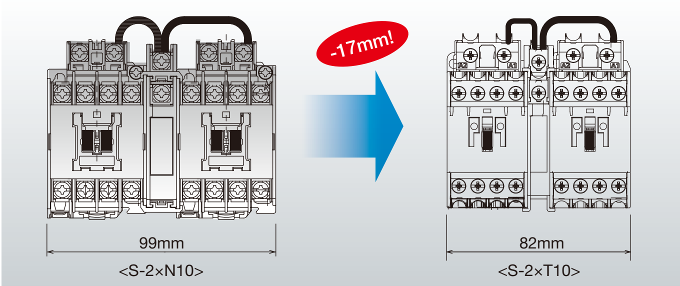
(For mounting details, please refer to "mounting on Page 44.)

Frame size		11A	13A		20A	25A
Traditional MS-N Series	Front view	43 S-N10	43 S-N11 (Auxiliary 1-pole)	53 S-N12 (Auxiliary 2-pole)	63 S-N20	75 S-N25
New slimline MS-T Series	Front view	36 -7mm! S-T10	43 -10mm! S-T12 (Auxiliary 2-pole)		43 -20mm! S-T20	63 -12mm! S-T25

Slimline Reversing type

The new slimline design has also been applied to the mechanical interlocks used to create Reversing Magnetic Contactor configurations, helping to save even more switchboard panel space.

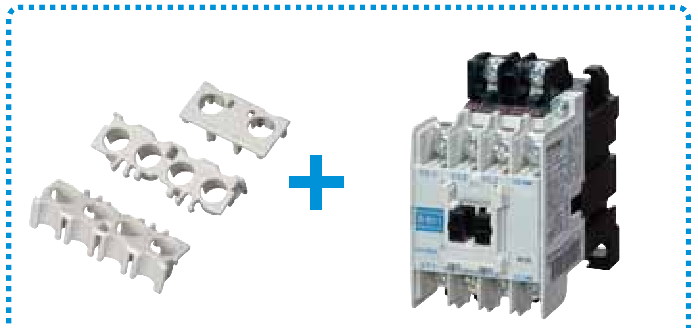
(Example)



Standardization Standardization

New integrated terminal covers

The perennial issues of remembering to order the terminal covers, fitting them correctly or loosing them in the process are challenges of the past. The integrated terminal cover system means they are always there, on the Magnetic Contactor or its Auxiliary contact, ready to be used.


Traditional solution: Cover + Contactor



Reduce your coil inventory by up to 50%

The new ST series has new wide range operating coils which mean 50% fewer variations are required to span the 24-550V voltage range compared to the previous SN series. This means a smaller stock burden for those users who hold main stock or spare parts.

Coil designation	Rated voltage [V] 50Hz	Rated voltage [V] 60Hz
AC12V	12	12
AC24V	24	24
AC48V	48—50	48—50
AC100V	100	100—110
AC120V	110—120	115—120
AC127V	125—127	127
AC200V	200	200—220
AC220V	208—220	220
AC230V	220—240	230—240
AC260V	240—260	260—280
AC380V	346—380	380
AC400V	380—415	400—440
AC440V	415—440	460—480
AC500V	500	500—550

Coil designation	Rated voltage [V] 50Hz/60Hz
AC24V	24
AC48V	48—50
AC100V	100—127
AC200V	200—240
AC300V	260—300
AC400V	380—440
AC500V	460—550

* 12VAC type is an order-made product.

A tough product for tough environments - as standard

Tropicalization treatment, anti-corrosion treatment and low temperature-response capabilities are now standard in the S-T type Magnetic Contactor range, so our customers do not need to worry about which version they are ordering.(note MSO-T and TH-T Magnetic Starters and thermal overloads have anti-corrosive treatment only)

Safety & Quality

No touch safety

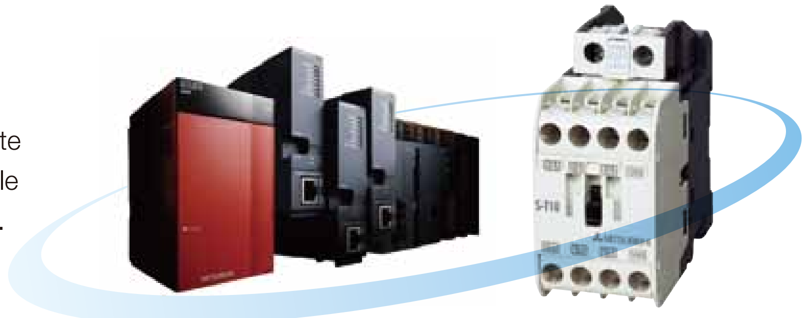
The integrated terminal covers offer various benefits not to mention added protection against electric shock through secure finger protection. This is available not only on Magnetic Contactors but also Thermal Overload relays, Contactor relays and Auxiliary Contact Units.

MS-T Series complies with DIN EN 50274/VDE 0660 Teil 514 for "Finger safe (prevention of finger contact)"



A light touch

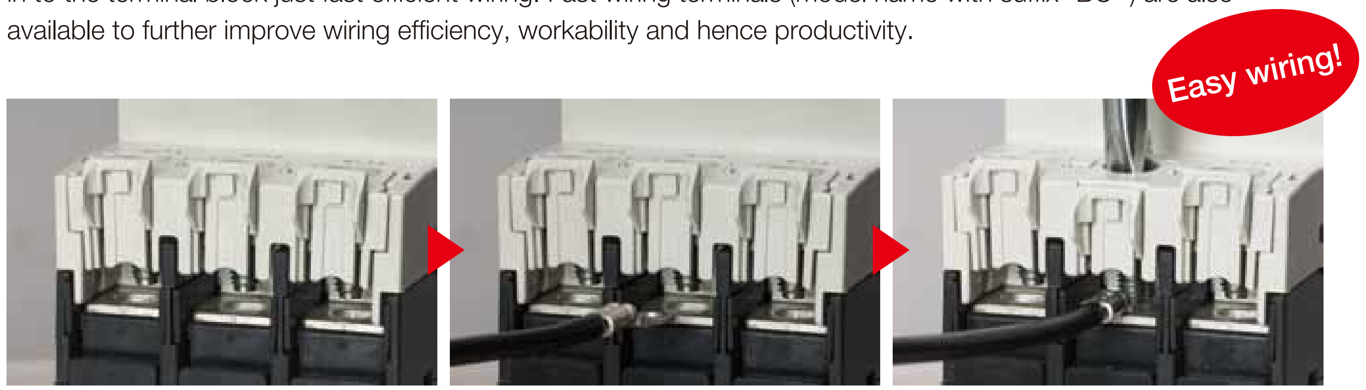
The MS-T Series' auxiliary contacts can operate with load as light as 20V 3mA making it suitable for direct control/operation from a PLC output.



Smart Wiring

Smart design means Smart wiring

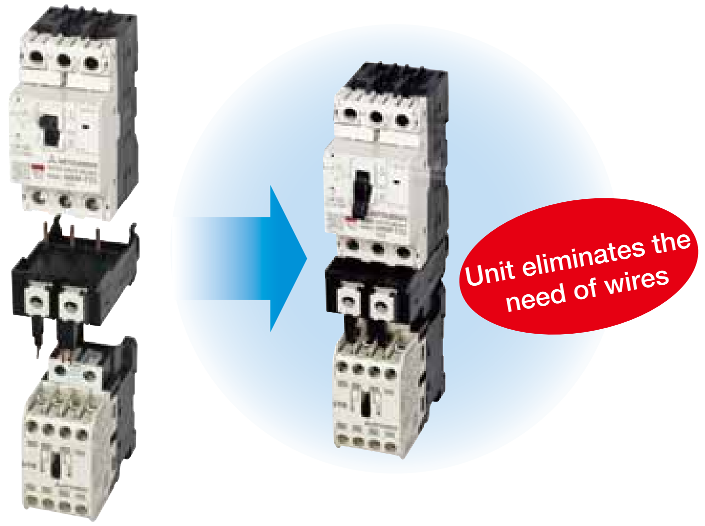
The integrated terminal covers have an additional benefit in that they act as a guide to improve wiring efficiency but also retain the terminal screw in place: no mislaying the screw, no dropping it or having trouble reinserting it in to the terminal block just fast efficient wiring. Fast wiring terminals (model name with suffix "BC") are also available to further improve wiring efficiency, workability and hence productivity.



① Screw holder lifts up the screw. ② Insert a ring crimp lug ③ Tighten the screw

Easy branch circuit wiring with Manual Motor Circuit Breaker and optional connection conductor unit

Easy wiring is available for the new MS-T Series by using the Manual Motor Circuit Breaker and optional connection conductor unit, contributing your productivity improvement.



Global Standard

Your confidence: Certified

Many customers are engaged in business which can mean them exporting to countries around the world and therefore having to comply with those local standards. The MS-T Series is certified to the highest international levels while work is ongoing to gain other country and shipping standards to help put your "mind at rest".

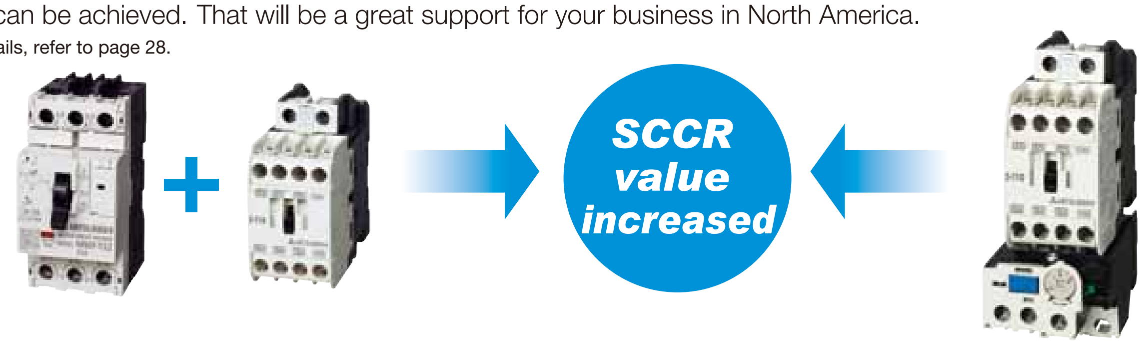
	Applicable standard					Safety certification standard
	International	Japan	European countries		China	U.S. & Canada
			EN / EC directive	Certificate authority	GB	
Standards	IEC Note	JIS	CE	TÜV Rheinland	CCC	c UL us

Note : Also compliant with the requirements for mirror contacts comply with IEC60947-4-1 Annex F.

Higher SCCR value achieved by using with Manual Motor Circuit Breaker

When the MMP-T Series and the MS-T Series are used together, the higher SCCR (UL short-circuit current rating) value, can be achieved. That will be a great support for your business in North America.

* For details, refer to page 28.



List of Produced Models

Magnetic Starters/Magnetic Contactors (NonReversing)

New release: T10, T12, T20, T21, T25, T32

Frame		T10	T12	T20	T21	T25	T32	N10	N11	N12	N18	N20	N21	N25	N35	N50	N65	N80	N95	N125	N150	N180	N220	N300	N400	N600	N800
Category AC-3 Rated capacity [kW]	220V	2.5	3.5	4.5	5.5	7.5	7.5	2.5	3.5	3.5	4.5	5.5	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	125	190	220
	440V	4	5.5	7.5	11	15	15	4	5.5	5.5	7.5	11	11	15	18.5	22	30	45	55	60	75	90	132	160	220	330	440
Auxiliary contact	Standard	1a	1a1b	1a1b	2a2b	2a2b	–	1a	1a	1a1b	–	1a1b	2a2b														
Model Name (Note 4)	Special	1b	2a,2b	2a	–	–	–	1b	1b	2a,2b	–	2a	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Starters – Enclosed	Standard MS-□	◇	◇	–	◇	–	–	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Enclosed	With push button MS-□PM	◇	◇	–	◇	–	–	○	○	–	–	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–
Magnetic Starters – Enclosed	3-element type MS-□KP	◇	◇	–	◇	–	–	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Enclosed	Quick motion type MS-□QM	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	Standard MSO-□	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	DC operated type MSOD-□	–	◇	◇	◇	–	–	–	○	○	–	–	○	–	○	○	○	○	○	○	○	–	○	○	○	–	–
Magnetic Starters – Open type	Delay trip type MSO-□SR	○	○	○	○	○	–	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	Quick trip type MSO-□FS	–	–	–	○	○	–	–	–	–	–	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–
Magnetic Starters – Open type	3-element type MSO-□KP	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	3-element delay trip type MSO-□KPSR	–	–	–	○	○	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	3-element quick trip type MSO-□FSKP	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Starters – Open type	3-element quick trip type MSO-□KF	–	–	–	–	–	–	○	○	○	–	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–
Magnetic Starters – Open type	Quick motion type MSO-□QM	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	Mechanically latched type MSOL-□ / MSOLD-□	–	–	–	◇	–	–	–	–	–	–	–	○	–	○	○	○	○	○	○	○	–	○	○	○	–	–
Magnetic Starters – Open type	Delay open type MSO-□DL	–	◇	–	◇	–	–	–	–	○	–	–	○	–	○	○	○	○	○	–	○	–	○	○	○	–	–
Magnetic Starters – Open type	With terminal cover MSO-□CX (Note 3)	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–
Magnetic Starters – Open type	With fast wiring terminal MSO-□BC	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Contactors – Open type	Standard S-□	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Magnetic Contactors – Open type	DC operated type SD-□	–	◇	◇	◇	–	◇	–	○	○	–	–	○	–	○	○	○	○	○	○	○	–	○	○	○	○	○
Magnetic Contactors – Open type	Mechanically latched type SL-□ / SLD-□	–	–	–	◇	–	–	–	–	–	–	–	○	–	○	○	○	○	○	○	○	–	○	○	○	○	○
Magnetic Contactors – Open type	With surge absorber S-□SA (Note 2)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Contactors – Open type	With surge absorber SD-□SA	–	◇	◇	◇	–	◇	–	○	○	–	–	○	–	○	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Contactors – Open type	Quick motion type S-□QM	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Contactors – Open type	With terminal cover S-□CX (Note 3)	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–
Magnetic Contactors – Open type	With fast wiring terminal S-□BC	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Contactors – Open type	Delay open type S-□DL	–	◇	–	◇	–	–	–	–	○	–	–	○	–	○	○	○	○	○	–	○	–	○	○	○	–	–

Note 1: ○ : Already released. ◇ : To be released in the future. - : No plan to be released.
Note 2: S-T□SA type is a surge absorber-installed type. Alternate current operation coils of N50 to N800 types with surge absorption function contained do not generate coil open/close surge, so that a surge absorber for coil is not required.
Note 3: Magnetic Contactors and Thermal Overload Relays in MSO/S-N50CX and N65CX are provided with a terminal cover.
Note 4: The auxiliary contact arrangements for mechanical latch type and delay release type are different. For details, please refer to the Catalog for MS-N.

Thermal Overload Relays

New release: T18, T25

Frame		T18	T25	N12	N18	N20	N20TA	N60	N60TA	N120	N120TA	N220	N400	N600
Heater designation		0.12 to 15	0.24 to 22	0.12 to 11	1.3 to 15	0.24 to 15	22 to 29	15 to 54	67 to 82	42 to 82	105 to 125	82 to 180	105 to 330	250 to 660
Thermal	Standard TH-□	○	○	○	○	○	○	○	○	○	○	○	○	○
Thermal	Delay trip type TH-□SR	○	○	○	–	○	○	○	○	○	○	○	○	○
Thermal	Quick trip type TH-□FS	–	○	–	–	○	○	○	○	–	–	–	–	–
Thermal	3-element type TH-□KP	○	○	○	○	○	○	○	○	○	○	○	○	○
Thermal	3-element delay trip type TH-□KPSR	–	○	–	–	○	○	○	○	○	○	○	○	○
Thermal	3-element quick trip type TH-□FSKP	○	○	–	–	–	–	–	–	–	–	–	–	–
Thermal	3-element quick trip type TH-□KF	–	–	○	–	○	○	○	○	–	–	–	–	–
Thermal	With terminal cover TH-□CX	–	–	○	○	○	○	○	○	–	–	–	–	–
Thermal	With fast wiring terminal TH-□BC	○	○	–	–	–	–	–	–	–	–	–	–	–

Note 1: ○ : Already released. ◇ : To be released in the future. - : No plan to be released.

Magnetic Starters/Magnetic Contactors (Reversing)

New release: 2x T10, 2x T12, 2x T20, 2x T21, 2x T25, 2x T32

Frame		2x T10	2x T12	2x T20	2x T21	2x T25	2x T32	2x N10	2x N11	2x N18	2x N20	2x N21	2x N25	2x N35	2x N50	2x N65	2x N80	2x N95	2x N125	2x N150	2x N180	2x N220	2x N300	2x N400	2x N600	2x N800
Category AC-3 Rated capacity [kW]	220V	2.5	3.5	4.5	5.5	7.5	7.5	2.5	3.5	4.5	5.5	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	125	190	220
	440V	4	5.5	7.5	11	15	15	4	5.5	7.5	11	11	15	18.5	22	30	45	55	60	75	90	132	160	220	330	440
Auxiliary contact	Standard	(1ax2) +2b	(1a1bx2) +2b		2a2bx2			(1ax2) +2b	(1ax2) +2b	2a2b x2	1a1b x2	2a2bx2								3a3bx2					4a4bx2	
Model Name (Notes 4 to 6)	Special	(1bx2) +2b	(2ax2) +2b		–	–	–	(1bx2) +2b	(1ax2) +2b	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Starters – Enclosed	Standard MS-□	–	–	–	◇	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Enclosed	3-element type MS-□KP	–	–	–	◇	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	Standard MSO-□	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	DC operated type MSOD-□	–	◇	◇	◇	–	–	–	○	–	–	○	–	○	○	○	○	○	○	○	–	○	○	○	–	–
Magnetic Starters – Open type	Delay trip type MSO-□SR	○	○	○	○	○	–	○	○	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	3-element quick trip type MSO-□FSKP	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Starters – Open type	3-element quick trip type MSO-□KF	–	–	–	–	–	–	○	○	–	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–
Magnetic Starters – Open type	3-element type MSO-□KP	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–
Magnetic Starters – Open type	With terminal cover MSO-□CX (Note 3)	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–
Magnetic Starters – Open type	With fast wiring terminal MSO-□BC	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Contactors – Open type	Standard S-□	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Magnetic Contactors – Open type	DC operated type SD-□	–	◇	◇	◇	–	◇	–	○	–	–	○	–	○	○	○	○	○	○	○	–	○	○	○	○	○
Magnetic Contactors – Open type	Mechanically latched type SL-□ / SLD-□	–	–	–	◇	–	–	–	–	–	–	○	–	○	○	○	○	○	○	○	–	○	○	○	○	○
Magnetic Contactors – Open type	With surge absorber S-□SA (Note 2)	○	○	○	○	○	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Contactors – Open type	With surge absorber SD-□SA	–	◇	◇	◇	–	◇	–	○	–	–	○	–	○	–	–	–	–	–	–	–	–	–	–	–	–
Magnetic Contactors – Open type	With terminal cover S-□CX (Note 3)	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–
Magnetic Contactors – Open type	With fast wiring terminal S-□BC	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Note 1: ○ : Already released. ◇ : To be released in the future. - : No plan to be released.
Note 2: S-2 x T□SA type is a surge absorber-installed type. Alternate current operation coils of N50 to N800 types with surge absorption function contained do not generate coil open/close surge, so that a surge absorber for coil is not required.
Note 3: Magnetic Contactors and Thermal Overload Relays in MSO/S-2 x N50CX and 2 x N65CX are provided with a terminal cover.
Note 4: +2b of T10 and T12 auxiliary contact arrangements in Reversing type represents b contact built in the UT-ML11 interlock unit.
Note 5: For auxiliary contact arrangement in Reversing type, X2 is displayed as combined auxiliary contact arrangement of two Magnetic Contactors.Please specify the contact arrangement for which two main units are combined must be designated.<Designation example> In case of 1b x 2 + 2b: 2B
Note 6: The auxiliary contact arrangement from mechanical latch type is different. For details, please refer to the Catalog for MS-N.

Contactor Relays

New release: T5, T9

Frame		T5	T9	N4	N5	N8
Number of contacts		5	9	4	5	8
Contact arrangement		5a	9a	4a	5a	8a
		4a1b	7a2b	3a1b	4a1b	7a1b
		3a2b	5a4b	2a2b	3a3b / 2a3b	6a2b / 5a3b / 4a4b
Standard	SR-□	○	○	○	○	○
DC operated type	SRD-□	◇	◇	○	○	○
With large rated auxiliary contacts	SR-□JH	○	○	○	○	○
With large rated auxiliary contacts	SRD-□JH	◇	◇	○	○	○
With terminal cover	SR-□CX	–	–	○	○	○
With terminal cover	SRD-□CX			○	○	○
Wiring fast wiring terminal	SR-□BC	○	○	–	–	–
With surge absorber	SR-□SA	○	○	○	○	○
With surge absorber	SRD-□SA	◇	◇	○	○	○

Note 1: ○ : Already released. ◇ : To be released in the future. - : No plan to be released.

MS-T Series Introduction
Selection and Application
Application to Thermal Overload Relays
Product Introduction
Overseas Standard
Type Codes
Order Procedure
Outline Drawing
Warranty and Safety

Specification List Table

Magnetic Starters/Magnetic Contactors

Frame				T10	T12	T20	T21	T25	T32
Applicable standard				IEC60947-4-1,EN60947-4-1,JIS C8201-4-1					
Model name	Magnetic Contactors (Without Thermal Overload Relays, Open type)		Non-Reversing	S-T10	S-T12	S-T20	S-T21	S-T25	S-T32
			Reversing	S-2×T10	S-2×T12	S-2×T20	S-2×T21	S-2×T25	S-2×T32
	Magnetic Starters (With standard 2-element, With Thermal Overload Relays)	Open type	Non-Reversing	MSO-T10	MSO-T12	MSO-T20	MSO-T21	MSO-T25	–
			Reversing	MSO-2×T10	MSO-2×T12	MSO-2×T20	MSO-2×T21	MSO-2×T25	–
		Combined Thermal Overload Relays		TH-T18			TH-T25		–
	Magnetic Starters (With 3-element type Thermal Overload Relays)	Open type	Non-Reversing	MSO-T10KP	MSO-T12KP	MSO-T20KP	MSO-T21KP	MSO-T25KP	–
			Reversing	MSO-2×T10KP	MSO-2×T12KP	MSO-2×T20KP	MSO-2×T21KP	MSO-2×T25KP	–
		Combined Thermal Overload Relays		TH-T18KP			TH-T25KP		–
Main contact rating	Rated insulation voltage [V]			690					
	Rated impulse withstand voltage [kV]			6					
	Rated frequency [Hz]			50/60					
	Pollution degree			3					
	Category AC-3 (Three-phase squirrel-cage motor load standard responsibility) (Note 1) [kW/A]		220 to 240VAC	2.5/11	3.5/13	4.5/18	5.5/25	7.5/30(7.5/26)	7.5/32
			380 to 440VAC	4/9	5.5/12	7.5/18	11/23	15/30(15/26)	15/32
			500VAC	4/7	5.5/9	7.5/17	11/17	15/24	15/24
			690VAC	4/5	5.5/7	7.5/9	7.5/9	11/12	11/12
	Category AC-4 (Three-phase squirrel-cage motor load inching responsibility) [kW/A]		220 to 240VAC	1.5/8	2.2/11	3.7/18	3.7/18	4.5/20	5.5/26
			380 to 440VAC	2.2/6	4/9	5.5/13	5.5/13	7.5/17	11/24
			500VAC	2.7/6	5.5/9	5.5/10	5.5/10	7.5/12	7.5/13
	Category AC-1 (Resistance, heater load)		100 to 240VAC	20	20	20	32	32	32
			380 to 440VAC	11	13	13	32	32	32
	Conventional free air thermal current Ith [A]			20	20	20	32	32	32
Auxiliary contact rating	Contact arrangement	Standard accessory	Non-Reversing	1a	1a1b		2a2b		–
			Reversing (Note 3, Note 5)	1a×2+2b	1a1b×2+2b		2a2b×2		–
		Special accessory	Non-Reversing	1b	2a		–		–
			Reversing (Note 3, Note 5)	1b×2+2b	2a×2+2b		–	–	–
		Max. number of additional options (Note 4)	Non-Reversing	*1	*1	*1	*1	*1	*1
			Reversing (Note 3, Note 5)	*2	*2	*2	*2	*2	*2
	Rated operational current (Category AC-15 : Alternating current coil load)		120VAC	6					
			240VAC	3					
	Rated operational current (Category DC-13 : Direct current coil load)		24VDC	3					
			110VDC	0.6					
	Conventional free air thermal current Ith [A]			10					
Performance	Mechanical durability [ten thousand times]			1000					
	Electrical durability [ten thousand times]		Category AC-3	Please refer to the Electrical durability curve on Page 13					
			Category AC-4	Please refer to the Electrical durability curve on Page 13					
			Category AC-1	50					
	Switching frequency [time/hour]		Category AC-3	1800					
			Category AC-4	300					
			Category AC-1	1200					
Characteristic	Coil consumption (Note 6)		Inrush [VA]	45			75		55
			Sealed [VA]	7			6		4.5
	Power consumption (Note 6) [W]			2.2	2.2	2.2	2.4	2.4	1.8
Outside dimensions	Magnetic Contactors (without Thermal Overload Relays) (Width x Height x Depth) [mm]		Non-Reversing	36×75×78	43×75×78	43×75×78	63×81×81	63×81×81	43×81×81
			Reversing	82×85×78	97×85×78	97×85×78	136×81×81	136×81×81	96×81×111
	Open type Magnetic Starters (Width x Height x Depth) [mm]		Non-Reversing	45×115×79	45×115×79	45×115×79	63×128×82	63×128×82	–
			Reversing	90×125×79	97×125×79	97×125×79	136×128×82	136×128×82	–
IEC 35mm rail mounting				Possible	Possible	Possible	Possible	Possible	Possible
Models of mountable options	Additional auxiliary contact block	(Contact arrangement 1a1b)		UT-AX2/AX11 * Scheduled to be released in fiscal 2013					
		(Contact arrangement 2a2b)		UT-AX4					
	Operation coil surge absorber unit	(Varistor) (Note 2)		UT-SA21					
		(Varistor + indicating LED)		UT-SA22					
		(CR)		UT-SA23					
		(Varistor + CR)		UT-SA25					
	Mechanical interlocks			UT-ML11			UN-ML21		

Note 1: The content within ( ) of rated capacity and rated operational current is applied to the Magnetic Starter.
Note 2: Coil surge absorber-mounted type (□-□ SA type) is also manufactured. UT-SA21 type is mounted.
Note 3: +2b of T10 and T12 auxiliary contact arrangements in Reversing type represents b contact built in the UT-ML11 interlock unit.
Note 4: The maximum number of additional options is equal to the number of auxiliary contact units UT-AX4 mounted on the main unit.
The number of auxiliary contact unit to be mounted is one for *1-marked model and is two for *2-marked model. The main unit and auxiliary contact unit must be separately arranged and additionally mounted by the customer.
Note 5: For auxiliary contact arrangement in Reversing type, X2 is displayed as combined auxiliary contact arrangement of two Magnetic Contactors. Please specify the contact arrangement for which two main units are combined must be designated. <Designation example> In case of 1b x 2 + 2b: 2B
Note 6: Operational coil input and coil consumption are average values in case of applying 220V60Hz to AC200V coil.

Making and Breaking capacities

Frame		T10	T12	T20	T21	T25	T32
Making capacity Category AC-3 [A]	220 to 240VAC	110	130	180	250	300	320
	380 to 440VAC	90	120	180	230	300	320
	500VAC	70	90	170	170	240	240
Breaking capacity Category AC-4 [A]	220 to 240VAC	88	104	144	200	240	256
	380 to 440VAC	72	96	144	184	240	256
	500VAC	56	72	136	136	192	192

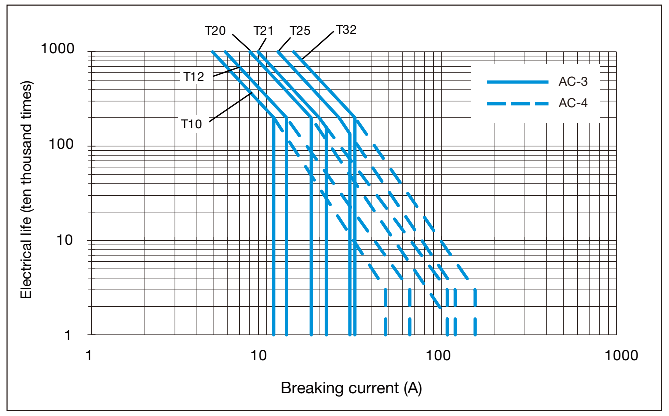
Note 1: Open/close frequency of closed circuit current capacity and breaking current capacity is 50 respectively (IEC60947-4-1).

Short-circuit Coordination

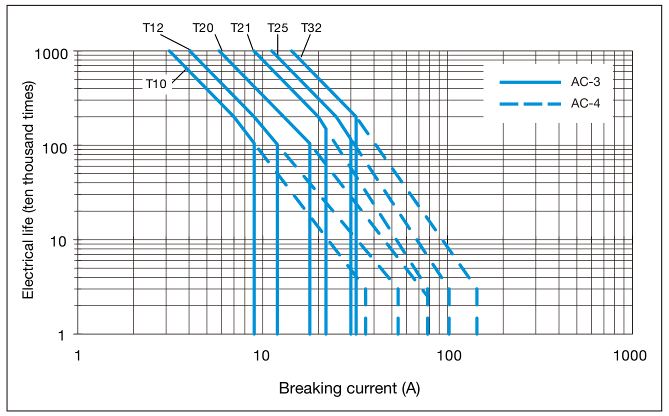
Magnetic Contactors model			S-T10	S-T12	S-T20	S-T21	S-T25	S-T32	SR-T5/T9
Type 1	Short-circuit protection device rating * Fuse gG (IEC60269-1/2)	Main circuit	40A			80A			–
		Auxiliary circuit	10A					–	10A

Electrical Durability Curve

●Main circuit voltage 220 to 240VAC



●Main circuit voltage 380 to 440VAC



Coil Ratings

Coil types and ratings (Alternating current operation type)

●For S-T10 to T32 types
For SR-T5 and T9 types

Coil designation	Rated voltage [V] 50Hz/60Hz	Coil display
AC24V	24	Rated voltage and frequency
AC48V	48-50	
AC100V	100-127	
AC200V	200-240	
AC300V	260-300	
AC400V	380-440	
AC500V	460-550	

Note : Even when the single rating (example: 200V60Hz) is specified for an order, the above rating voltage is indicated on the product.

For S-T10SA to T32SA types
For SR-T5SA and T9SA types

Coil designation	Rated voltage [V] 50Hz/60Hz	Coil indication	Varistor voltage [V]
AC24V	24	Rated voltage and frequency	120
AC48V	48-50		120
AC100V	100-127		470
AC200V	200-240		470
AC300V	260-300		910
AC400V	380-440		910

Note 1: Add "SA" to the end of the type name to order the operation coil surge absorber mounting type (varistor).
Example: S-T10SA AC100V
Note 2: Even when the single rating (example: 200V60Hz) is specified for an order, the above rating voltage is indicated on the product.

Contact Reliability

Contact reliability of main and auxiliary contacts

The minimum working voltage and current of the main and auxiliary contacts of the S-T type Magnetic Contactors and the contact of the SR-T type Contactor Relays vary depending on the allowable failure rate. Apply the following diagrams.

■The contact reliability reduces when a contact is connected in series or when the current is applied and broken at the time of opening and closing the contact.
Prescribe remedies such as connecting the contact in parallel (providing redundancy).

■The contact must be connected in parallel (providing redundancy) if reliability greater than the contact reliability shown the diagrams 1 to 3 is required.

Magnetic Contactors

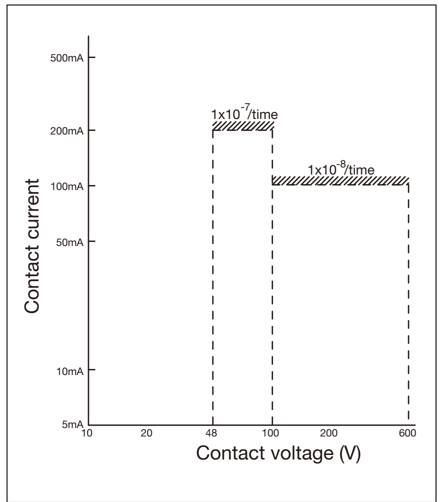


Diagram 1. S-T main contact

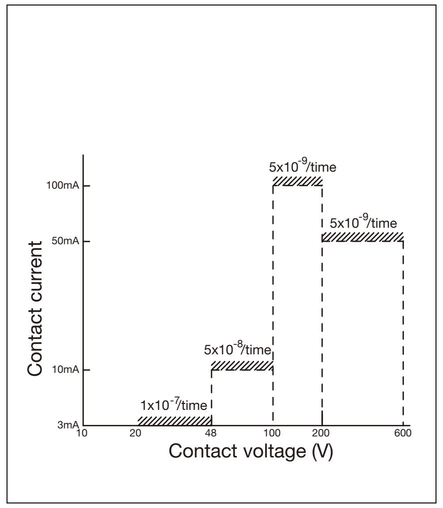


Diagram 2. S-T auxiliary contact

Contactor Relays

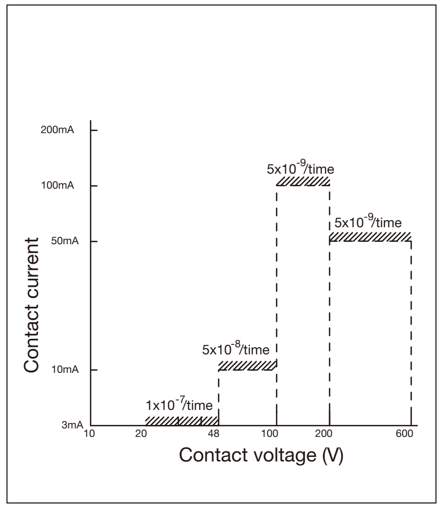


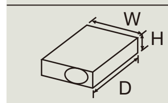
Diagram 3. SR-T5, T9 ,UT-Ax4

Note 1: The contact reliability indicates the failure rate λ60 (the number of failures/the number of opening and closing operations, per contact) at 60% reliability standard.
This reliability is applied when the product is in use under a clean atmosphere in the standard specification environment (Refer to page 44).
Note 2: The contact resistance of the contacts may change due to economical corrosion and that may affect the contacts in the case of a light load.
It is recommended that regular inspections to be conducted, with load opening and closing performed several times in the inspection, and that consideration be provided on the system side.

Specification List

Thermal Overload Relays

Model list

Frame			T18	T25
Appearance				
Model name	with 2-elements	For Magnetic Starters	TH-T18	TH-T25
		For independent mounting	–	
	with 3-elements	For Magnetic Starters	TH-T18KP	TH-T25KP
		For independent mounting	–	
 W H D	Outside dimensions [mm] W×H×D	For Magnetic Starters	45×55×76.5	63×51×79
		For independent mounting	–	
	Product weight [kg]	For Magnetic Starters	0.11	0.16
		For independent mounting	–	
Applicable standard			IEC, EN,JIS	
Use condition		Ambient temperature [°C]	-10 to +40 (Standard: 20°C; maximum temperature on the board: 55°C)	
		Frequency [Hz]	0(DC) to 400	
Main circuit specifications	Rated insulation voltage [V]		690	
	Rated impulse withstand voltage [kV]		6	
	Pollution degree		3	
	Heater designation (adjustable range of stabilized current) [A] (Rated operational voltage : 550V maximum)		0.12 (0.1 to 0.16) 0.17 (0.14 to 0.22) 0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18)	0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18) 22 (18 to 26)
	Power consumption [VA/element] at minimum/maximum stabilization		0.8 / 1.8	1.0 / 2.1
	Terminal screw size		M3.5	M4
	Compatible with terminal	Electric wire size [mm^2]	ϕ1.6, 0.75 to 2.5	ϕ1.6 to 2.6, 1.25 to 6
		Crimp lug size	1.25-3.5 to 2-3.5, 5.5-S3	1.25-4 to 5.5-4
Operation circuit (contact) specifications	Contact arrangement		1a1b	1a1b
	Conventional free air thermal current Ith [A]		2	5
	Rating Operational Current [A] — Category AC-15 (AC operated Magnetic Contactors Coil opening and closing) a contact/b contact. The value in brackets indicates the rating for automatic reset.	24VAC	2(0.5) / 2(0.5)	2(0.5) / 3(0.5)
		120VAC	2(0.5) / 2(0.5)	2(0.5) / 3(0.5)
		240VAC	1(0.5) / 1(0.5)	1(0.5) / 2(0.5)
		550VAC	0.3(0.3) / 0.3(0.3)	0.3(0.3) / 0.3(0.3)
	Rating Operational Current [A] — Category DC-13 (DC operated Magnetic Contactors Coil opening and closing) The value in brackets indicates the rating for automatic reset.	24VDC	0.5(0.3)	1(0.3)
		110VDC	0.2(0.2)	0.2(0.2)
		220VDC	0.1(0.1)	0.1(0.1)
	Minimum applicable load level		20V 5mA	20V 5mA
	Terminal screw size		M3.5	M3.5
	Compatible with terminal	Electric wire size [mm^2]	ϕ1.6, 0.75 to 2.5	ϕ1.6, 0.75 to 2.5
		Crimp lug size	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5
Characteristics/Functions	Trip class		10A	
	Operating characteristic curve description page		Page 17	
	Vibration resistance (vibration resistance malfunction performance)		10 to 55 Hz, 19.6 m/s^2	
	Trip-free		◎	◎
	Reset method		Manual/Automatic switchable	Manual/Automatic switchable
	Operation indication (lever indication)		◎	◎
	Manual trip check		◎	◎

Note 1: The ambient temperature compensator is mounted on all types.
Note 2: ◎ indicates standard equipment. ○ : Already released.

Selection Table

Thermal Overload Relays

Application to standard three-phase motor of Thermal Overload Relays

<table>
<tr><th colspan="6">Thermal Overload Relays</th><th colspan="2">Standard three-phase motor capacity [kW]</th><th colspan="5">Magnetic Contactors that can be combined</th></tr>
<tr><th rowspan="2">Heater designation (A)</th><th rowspan="2">Setting range (A)</th><th colspan="2">Short-circuit protector rating (A) * Fuse gG (IEC60269-1/2)</th><th rowspan="2" colspan="2">Frame</th><th rowspan="2">200-220V</th><th rowspan="2">380-440V</th><th rowspan="2" colspan="3">TH-T18</th><th rowspan="2" colspan="2">TH-T25</th></tr>
<tr><th>Main circuit</th><th>Auxiliary circuit</th></tr>
<tr><td>0.12</td><td>0.1-0.16</td><td>2</td><td>6</td><td rowspan="17">TH-T18</td><td rowspan="2"></td><td></td><td></td><td rowspan="15">S-T10</td><td rowspan="16">S-T12</td><td rowspan="17">S-T20</td><td rowspan="2" colspan="2"></td></tr>
<tr><td>0.17</td><td>0.14-0.22</td><td>2</td><td>6</td><td></td><td></td></tr>
<tr><td>0.24</td><td>0.2-0.32</td><td>2</td><td>6</td><td rowspan="16">TH-T25</td><td>0.03</td><td>0.05</td><td rowspan="16">S-T21</td><td rowspan="16">S-T25</td></tr>
<tr><td>0.35</td><td>0.28-0.42</td><td>2</td><td>6</td><td>0.05</td><td>0.1</td></tr>
<tr><td>0.5</td><td>0.4-0.6</td><td>2</td><td>6</td><td>0.07</td><td></td></tr>
<tr><td>0.7</td><td>0.55-0.85</td><td>4</td><td>6</td><td>0.1</td><td>0.18</td></tr>
<tr><td>0.9</td><td>0.7-1.1</td><td>4</td><td>6</td><td></td><td>0.25</td></tr>
<tr><td>1.3</td><td>1.0-1.6</td><td>4</td><td>6</td><td>0.2</td><td>0.37, 0.55</td></tr>
<tr><td>1.7</td><td>1.4-2.0</td><td>6</td><td>6</td><td></td><td>0.75</td></tr>
<tr><td>2.1</td><td>1.7-2.5</td><td>6</td><td>6</td><td>0.4</td><td></td></tr>
<tr><td>2.5</td><td>2.0-3.0</td><td>10</td><td>6</td><td></td><td>1.1</td></tr>
<tr><td>3.6</td><td>2.8-4.4</td><td>10</td><td>6</td><td>0.75</td><td>1.5</td></tr>
<tr><td>5</td><td>4.0-6.0</td><td>16</td><td>6</td><td>1</td><td>2.2</td></tr>
<tr><td>6.6</td><td>5.2-8.0</td><td>20</td><td>6</td><td>1.5</td><td>3, 3.7</td></tr>
<tr><td>9</td><td>7.0-11</td><td>20</td><td>6</td><td>2.2</td><td>3, 3.7</td></tr>
<tr><td>11</td><td>9.0-13</td><td>25</td><td>6</td><td></td><td>5.5</td><td rowspan="3"></td></tr>
<tr><td>15</td><td>12-18</td><td>32</td><td>6</td><td>3.7</td><td>7.5, 9</td><td rowspan="2"></td></tr>
<tr><td>22</td><td>18-26</td><td>50</td><td>6</td><td></td><td>5.5</td><td>11</td><td></td></tr>
</table>

Precautions for Use

Thermal Overload Relays

Disassembly

The Thermal Overload Relays are adjusted at the time of assembly. Do not disassemble it.

Ambient temperature compensation

The TH-T type Thermal Overload Relays are adjusted with the Magnetic Starters in the standard box (the MS type) relative to the ambient temperature of 20°C (The temperature on the control board of the MSO type Magnetic Starters is 35°C). The ambient temperature compensator is mounted on the TH-T type Thermal Overload Relays. Therefore, the ambient temperature less affects the operational characteristic change. The minimum operating current change according to the ambient temperature change relative to the ambient temperature of 20°C (the temperature on the control board of 35°C) generally depends on the characteristics in the diagrams 1 and 2.
The Thermal Overload Relays have a characteristic that the operating current becomes high when the ambient temperature is low and becomes low when the ambient temperature is high. If the ambient temperature of the installation site is significantly different from 20°C (the temperature on the control board of 35°C), the setting current of the Thermal Overload Relays needs to be corrected as shown in diagrams 1 and 2. In addition, note that the compensation factor has a characteristic to be the minimum scale>middle scale>maximum scale at the adjustment knob location. (Note that the Thermal Overload Relays may operate at a current of less than 100% stabilized current if in use at temperatures exceeding the allowable working temperature of 40°C (55°C).)

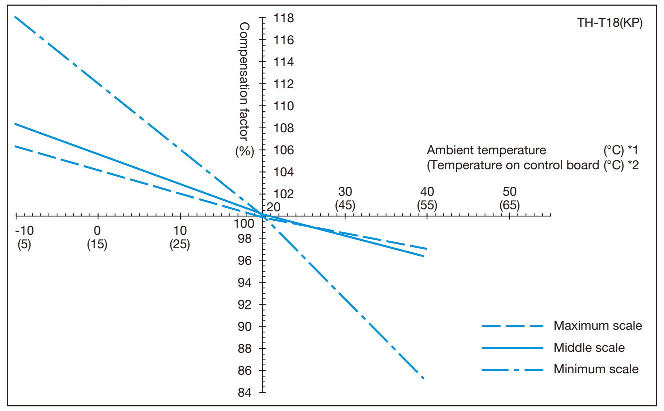


Diagram 1. Ambient temperature compensation curve (T18 frame)

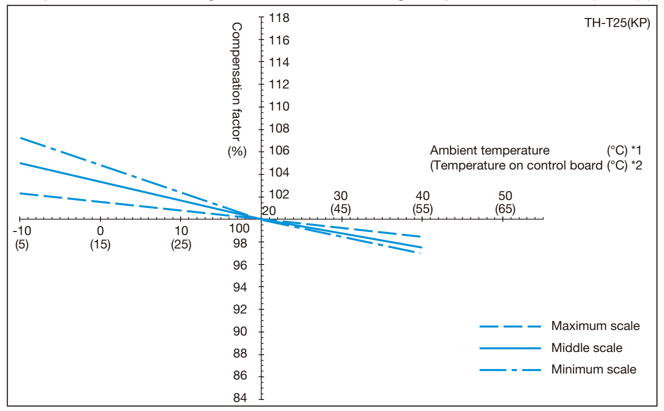


Diagram 2. Ambient temperature compensation curve (T25 frame)

Compensation factor: Percentage of the minimum operating current at the ambient temperature of 20°C
(the temperature on the control board of 35°C)

<Compensation procedure of setting current>
Determine the compensation factor of the working ambient temperature according to the curves in diagrams 1 and 2 and use the value of all load currents of the motor divided by the determined compensation factor as the stabilization value.
Example: The ambient temperature compensation factor for TH-T25 at the ambient temperature of 40°C (the temperature on the control board of 55°C) is 97% at the minimum scale according to diagram 2. If the motor rated current is 15A, the stabilization value is 15.5A (=15/0.97).)

Note 1: [*1] The ambient temperature applied to the MS type indicates the outside temperature of the box. To be released in the future
[*2] The temperature including temperature increase on the control board applied to the MSO type is indicated.

Connecting electric wire size and operating current

The TH-T type adjusts the minimum operating current with the standard electric wire size shown in the following table. If the electric wire is thicker or thinner than this standard electric wire size, the operating current becomes high or low, respectively. Therefore, correct the stabilized current (divide it by the change rate of the minimum operating current) to use a size different from the standard connecting electric wire size.

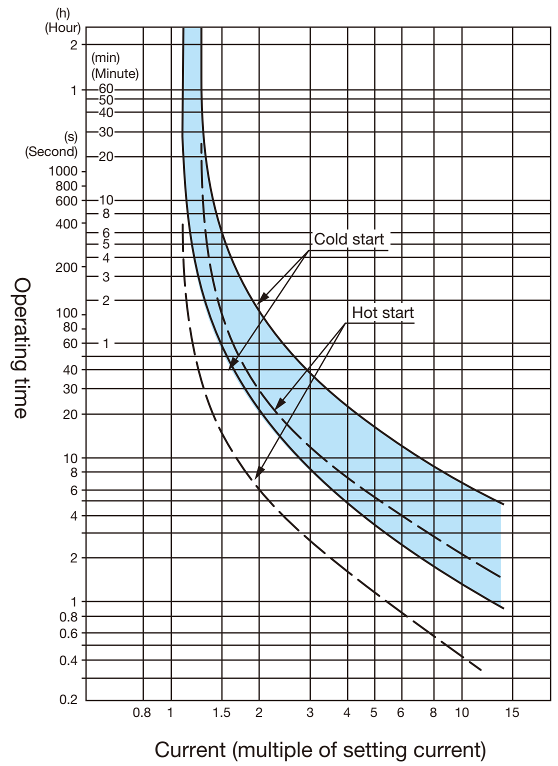
<table>
<tr><th>Model name</th><th>Heater designation [A]</th><th>Standard electric wire size [mm²]</th><th>Connecting electric wire size [mm²]</th><th>Change rate of minimum operating current [%]</th></tr>
<tr><td>TH-T18(KP)</td><td>0.12 to 15</td><td rowspan="2">2</td><td rowspan="2">1.25
2.5</td><td rowspan="2">98
103</td></tr>
<tr><td>TH-T25(KP)</td><td>0.24 to 11</td></tr>
<tr><td>TH-T25(KP)</td><td>15, 22</td><td>3.5</td><td>2
6</td><td>97
104</td></tr>
</table>

Operating Characteristic of Thermal Overload Relays (Ambient Temperature of 20°C)

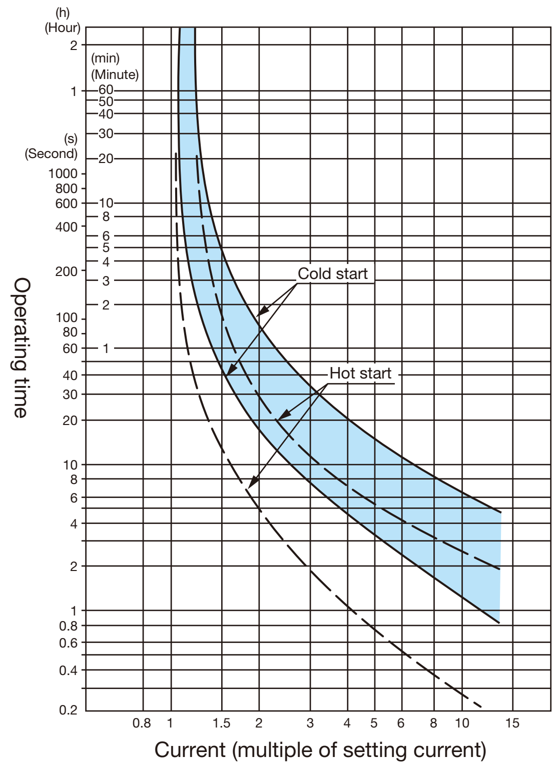
Thermal Overload Relays

For the information on the connecting electric wire size, refer to page 46.

● TH-T18, T18KP



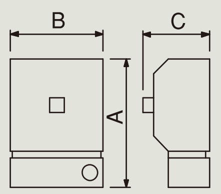
● TH-T25, T25KP



Magnetic Starters

●MSO-T series (non-Reversing)
●MSO-2xT series (Reversing)

Model name		Non-Reversing	MSO-T10	MSO-T12	MSO-T20	MSO-T21	MSO-T25
		Reversing	MSO-2×T10	MSO-2×T12	MSO-2×T20	MSO-2×T21	MSO-2×T25
Rated capacity (kW) Category AC-3		220 to 240VAC	2.5	3.5	4.5	5.5	7.5
		380 to 440VAC	4	5.5	7.5	11	15
		500VAC	4	5.5	7.5	11	15
Heater rating (designation) of standard Thermal Overload Relays (A)			0.12 0.17 0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9	0.12 0.17 0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11	0.12 0.17 0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15	0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22	0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22
Operation coil rating			Refer to pages 13 and 14				
Auxiliary contact arrangement	Non-Reversing	Standard	1a	1a1b	1a1b	2a2b	2a2b
		Special	1b	2a	2a	—	—
	Reversing	Standard	1a×2+2b	1a1b×2+2b	1a1b×2+2b	2a2b×2	2a2b×2
		Special	1b×2+2b	2a×2+2b	2a×2+2b	—	—
Dimensions	Non-Reversing	A	115	115	115	128	128
		B	45	45	45	63	63
		C	79	79	79	82	82
	Reversing	A	125	125	125	128	128
		B	90	97	97	136	136
		C	79	79	79	82	82
IEC 35mm rail mounting type			←→				
Option	Front clip-on auxiliary contact block mounting type		←→				
	Side clip-on auxiliary contact block mounting type		←→				
	Surge absorber mounting type		←→				



●Thermal Overload Relays that can be combined with Magnetic Contactors

Thermal Overload Relays type names and heater types that can be combined with Magnetic Contactors

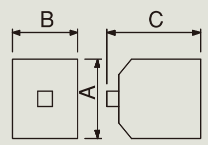
Magnetic Contactors frame	Thermal Overload Relays type name that can be combined	Heater designation (adjustable range of stabilized current) (A)
T10, T12, T20	TH-T18	0.12(0.1 to 0.16) 0.17(0.14 to 0.22) 0.24 (0.2 to 0.32) 0.35(0.28 to 0.42) 0.5(0.4 to 0.6) 0.7(0.55 to 0.85) 0.9(0.7 to 1.1) 1.3(1 to 1.6) 1.7(1.4 to 2) 2.1(1.7 to 2.5) 2.5(2 to 3) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13)* 15(12 to 18)*
T21, T25	TH-T25	0.24(0.2 to 0.32) 0.35(0.28 to 0.42) 0.5(0.4 to 0.6) 0.7(0.55 to 0.85) 0.9(0.7 to 1.1) 1.3(1 to 1.6) 1.7(1.4 to 2) 2.1(1.7 to 2.5) 2.5(2 to 3) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18) 22(18 to 26)*

Note 1: Select the value closer to the heater designation if the stabilized current has two values.
Note 2: Heater designation marked with * has Magnetic Starters frames that cannot be applied. For information on the applicable Magnetic Starters frames, refer to the "Heater rating (designation) of standard Thermal Overload Relays" field in the above table.

Magnetic Contactors

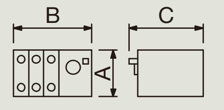
●S-T series (non-Reversing)
●S-2xT series (Reversing)

Model name		Non-Reversing	S-T10	S-T12	S-T20	S-T21	S-T25	S-T32
		Reversing	S-2×T10	S-2×T12	S-2×T20	S-2×T21	S-2×T25	S-2×T32
Rated operational current (A) Category AC-3		220 to 240VAC	11	13	18	25	30	32
		380 to 440VAC	9	12	18	23	30	32
		500 VAC	7	9	17	17	24	24
Conventional free air thermal current Ith (A)			20	20	20	32	32	32
Operation coil rating			Refer to pages 13 and 14					
Auxiliary contact arrangement	Non-Reversing	Standard	1a	1a1b	1a1b	2a2b	2a2b	—
		Special	1b	2a	2a	—	—	—
	Reversing	Standard	1a×2+2b	1a1b×2+2b	1a1b×2+2b	2a2b×2	2a2b×2	—
		Special	1b×2+2b	2b×2+2b	2b×2+2b	—	—	—
Dimensions	Non-Reversing	A	75	75	75	81	81	81
		B	36	43	43	63	63	43
		C	78	78	78	81	81	81
	Reversing	A	85	85	85	81	81	81
		B	82	97	97	136	136	96
		C	78	78	78	81	81	111
IEC 35mm rail mounting type			←→					
Option	Front clip-on auxiliary contact block mounting type		←→					
	Side clip-on auxiliary contact block mounting type		←→					
	Surge absorber mounting type		←→					



Thermal Overload Relays

●TH-T series

Model name		TH-T18	TH-T25
Application		MSO-T10 -T12 -T20	MSO-T21 -T25
Standard heater rating (designation) (A)		0.12, 0.17, 0.24, 0.35, 0.5, 0.7, 0.9,1.3, 1.7, 2.1, 2.5, 3.6, 5, 6.6, 9, 11, 15	0.24, 0.35, 0.5, 0.7, 0.9, 1.3, 1.7, 2.1, 2.5, 3.6, 5, 6.6, 9, 11, 15, 22
Contact arrangement		1a1b	1a1b
	A	55	51
	B	45	63
	C	76.5	79

●Heater types

Heater types of TH type Thermal Overload Relays

For Magnetic Starters		For single mounting		Heater designation (adjustable range of stabilized current) (A)
2-element	3-element	2-element	3-element	
T18	T18KP	— Note 1	— Note 1	0.12(0.1 to 0.16) 0.17(0.14 to 0.22) 0.24 (0.2 to 0.32) 0.35(0.28 to 0.42) 0.5(0.4 to 0.6) 0.7(0.55 to 0.85) 0.9(0.7 to 1.1) 1.3 (1 to 1.6) 1.7(1.4 to 2) 2.1(1.7 to 2.5) 2.5(2 to 3) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18)
T25	T25KP	T25 Note 1	T25KP Note 1	0.24(0.2 to 0.32) 0.35(0.28 to 0.42) 0.5(0.4 to 0.6) 0.7(0.55 to 0.85) 0.9(0.7 to 1.1) 1.3(1 to 1.6) 1.7(1.4 to 2) 2.1(1.7 to 2.5) 2.5(2 to 3) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18) 22(18 to 26)

Note 1: Combining UT-HZ18 To be released in the future allows the T18 frame to be used singly (screw mounting or IEC 35 mm rail mounting).
Combining UN-RM20 allows the T25 frame for single mounting to have the IEC 35mm rail mounted.

Contactor Relays

Specification List

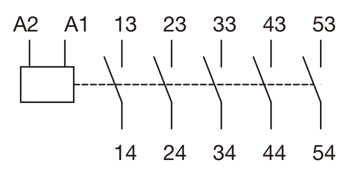
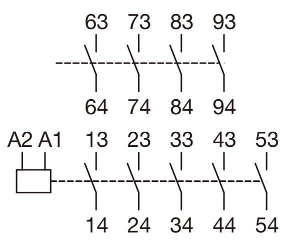
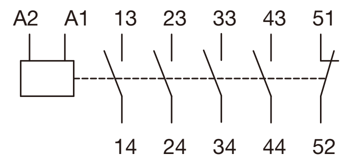
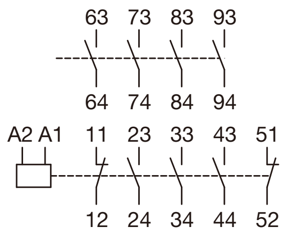
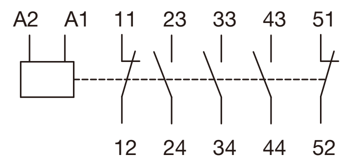
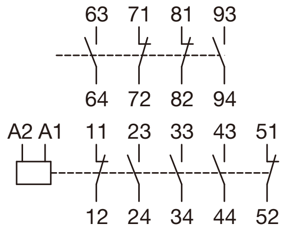
Model name				SR-T5	SR-T9
Number of poles				5	9
Contact arrangement				5a	9a
				4a1b	7a2b
				3a2b	5a4b
Rated insulation voltage [V]				690	
Rated impulse withstand voltage [kV]				6	
Rated frequency [Hz]				50/60	
Pollution degree				3	
Contact rating (Note 1)	AC rated operational current [A]	Category AC-15 (Coil load)	120VAC	6	
			240VAC	3	
			440VAC	1.5	
			550VAC	1.2	
		Category AC-12 (resistive load)	120VAC	10	
			240VAC	8	
			440VAC	5	
			550VAC	5	
	DC rated operational current [A]	Category DC-13 (large coil load)	24VDC	3	
			48VDC	1.5	
			110VDC	0.6(2)	
			220VDC	0.3(0.8)	
		Category DC-12 (resistive loads)	24VDC	10	
			48VDC	8	
			110VDC	5(8)	
			220VDC	1(3)	
	Minimum applicable load level			20V 3mA	
Performance	Mechanical durability [ten thousand times]			1,000	
	Electrical durability [ten thousand times]			50	
	Switching frequency [time/hour]			1,800	
Characteristic	Coil consumption (Note 3)	Inrush [VA]		47	
		Sealed [VA]		7	
	Power consumption (Note 3) [W]			2.2	
Optional unit (Note 2)	Surge absorber unit			○	○
	Additional auxiliary contact block			○	×
IEC 35mm rail mounting				○	○

Note 1: The value in brackets indicates the current when switching the load with two poles installed in series.
Note 2: In the optional unit field, ○ and X indicate mountable and non-mountable, respectively.
Note 3: Coil consumption are average values in case of applying 220V60Hz to AC200V coil.

MS-T Series Introduction
Selection and Application
Application to Thermal Overload Relays
Product Introduction
Overseas Standard
Type Codes
Order Procedure
Outline Drawing
Warranty and Safety

Contactor Relays

Contact arrangement/Contact placement

Model name	SR-T5	SR-T9
Contact arrangement	5a	9a
	4a1b	7a2b
	3a2b	5a4b
Contact placement	 5a	 9a
	 4a1b	 7a2b
	 3a2b	 5a4b

Combination with additional auxiliary contact block

The SR-T series contactor type Contactor Relay is usable in combination with the following additional auxiliary contact blocks.

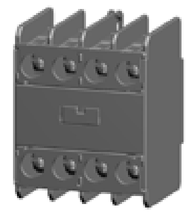
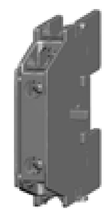
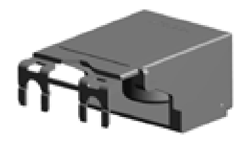
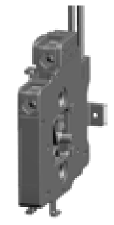
Contactor Relay \ Auxiliary contact blocks		Front clip-on						Side clip-on	
		UT-AX4			UT-AX2*			UT-AX11*	UT-AX11*
Model name	Contact arrangement	4a	3a1b	2a2b	2a	1a1b	2b	1a1b+1a1b	1a1b
SR-T5	5a	9a	8a1b	7a2b	7a	6a1b	5a2b	7a2b	6a1b
	4a1b	8a1b	7a2b	6a3b	6a1b	5a2b	4a3b	6a3b	5a2b
	3a2b	7a2b	6a3b	5a4b	5a2b	4a3b	3a4b	5a4b	4a3b

Note 1: The auxiliary contact blocks cannot be mounted on SR-T9.
Note 2: The Contactor Relay is not usable with front clip-on and side clip-on blocks mounted at the same time.
Note 3: The contact arrangements in ☐ are standard combinations.

* Scheduled to be released in fiscal 2013

Optional Units

Model list (for MS-T series)

Model name	Auxiliary contact blocks			Operation coil surge absorber unit				Mechanical interlocks
Type	UT-AX4	UT-AX2 *	UT-AX11 *	UT-SA23	UT-SA21	UT-SA22	UT-SA25	UT-ML11
Mounting	Front clip-on		Side clip-on	Mounting on top				Side clip-on
Specification/ Function	Twin contact built-in 4-pole auxiliary contact (4a, 2a2b, 3a1b)	Twin contact built-in 2-pole auxiliary contact (2a, 1a1b, 2b)	Twin contact built-in 2-pole auxiliary contact (1a1b)	Operation coil surge absorber: With CR AC200V	With varistor 48VAC (Shared with DC) 200VAC (Shared with DC) 400VAC	With varistor + indicating LED 200VAC (Shared with DC)	With varistor + CR 48VAC (Shared with DC) 200VAC (Shared with DC)	Combining it with two single Magnetic Contactors configures the reversing type. ML11 is the electrical interlock 2b contact built-in type.
Appearance (Typical example)	 UT-AX4		 UT-AX11	 UT-SA21				 UT-ML11
Applied model: Magnetic Starters / Magnetic Contactors	T10-T32		T10-T32	T10-T32				T10-T20
Applied model: Contactor Relays	SR-T5		SR-T5	SR-T5/T9				–
Others	Combination with UT-AX11 is not available.		Combination with UT-AX2/4 is not available.	–				–

* Scheduled to be released in fiscal 2013

Optional Units

●UT-AX□ auxiliary contact block

Ratings and specifications

Model name				UT-AX4	UT-AX2※	UT-AX11※
Mounting method				Front clip-on	Front clip-on	Side clip-on
Number of poles				4	2	2
Contact arrangement				4a	2a	1a1b
				3a1b	1a1b	
				2a2b	2b	
Applicable model	Magnetic Contactor			S-T10, T12, T20, T21, T25, T32		
	Contactor Relay			SR-T5		
Rated insulation voltage [V]				690		
Rated impulse withstand voltage [kV]				6		
Rated frequency [Hz]				50/60		
Pollution degree				3		
Contact rating (Note 2)	AC rated operational current [A]	Category AC-15 (coil load)	AC120V	6		
			AC240V	3		
			AC440V	1.5		
			AC550V	1.2		
		Category AC-12 (resistive load)	AC120V	10		
			AC240V	8		
			AC440V	5		
			AC550V	5		
	DC rated operational current [A]	Category DC-13 (large coil load)	DC24V	3		
			DC48V	1.5		
			DC110V	0.6(2)		
			DC220V	0.3(0.8)		
		Category DC-12 (resistive load)	DC24V	10		
			DC48V	8		
			DC110V	5(8)		
			DC220V	1(3)		
	Minimum applicable load level			20V 3mA		
Performance	Mechanical durability [ten thousand times]			1,000		
	Electrical durability [ten thousand times]			50		
	Switching frequency [time/hour]			1,800		
	Terminal screw size/type			M3.5 cross slot screw with pressure plate		
	Applicable electric wire size [ϕmm,mm²]			ϕ1.6 0.75 to 2.5		
	Applicable crimp lug size			1.25-3.5 to 2-3.5		
	Terminal screw tightening torque [N·m]			0.9 to 1.5		

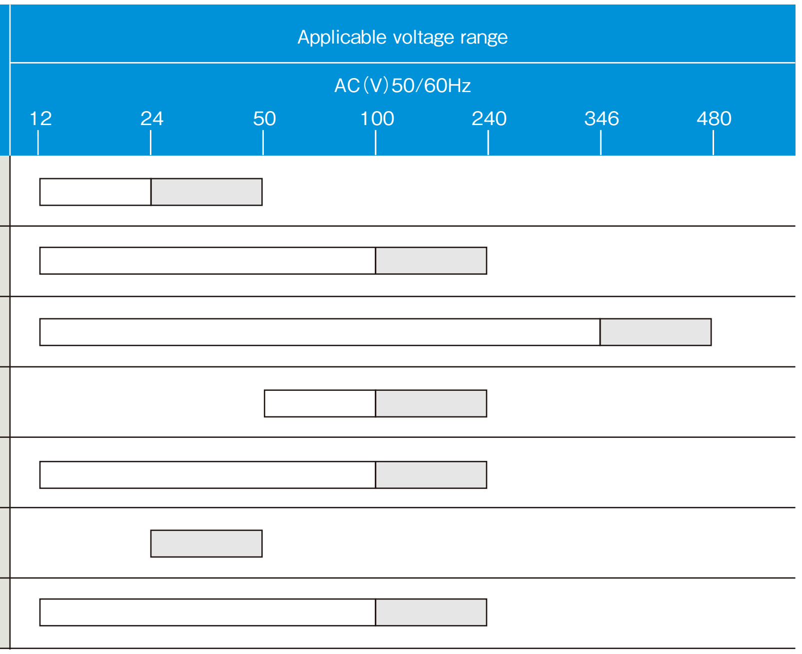
Note 1: It is not possible to mount both the front clip-on and side clip-on units at the same time.
Note 2: The value in brackets indicates the current when switching the load with two poles installed in series.

* Scheduled to be released in fiscal 2013

●UT-SA□ Operation Coil Surge Absorber Unit

Types and application

Surge absorber element	Model UT-	Designation	Internal element specifications
Varistor	SA21	AC 48V	Varistor voltage 120V
		AC 200V	Varistor voltage 470V
		AC 400V	Varistor voltage 910V
Varistor + indicating LED	SA22	AC 200V	Varistor voltage 470V
CR	SA23	AC 200V	0.2μF 120Ω
Varistor + CR	SA25	AC 48V	Varistor voltage120V 0.1μF 47Ω
		AC 200V	Varistor voltage470V 0.1μF 47Ω



□ Applicable voltage □ Rated voltage range

Note: The surge suppression effect for the applied circuit is smaller in the □ (applicable voltage) range than in the □ (recommended voltage) range.
Even in the □ (recommended voltage) range, the surge suppression effect may not be enough depending on the characteristics of the connected device.
(Check the influence of surge using the actual device in advance.)

Application and selection

Model	Applicable model: Magnetic Contactor	Applicable model: Contactor Relay
UT-SA21 UT-SA22 UT-SA23 UT-SA25	S-T10, T12, T20, T21, T25, T32	SR-T5,T9

Precautions for application

(1) Connect the terminals of surge absorber unit in parallel with the operation coil of the Magnetic Contactor or Contactor Relay.
(2) When used in combination with the surge absorber, the open time of the Magnetic Contactor or Contactor Relay may be 1.5 to 3 times longer.
(3) The surge absorber is designed to suppress the surge from the magnetic contactor. The warranty does not cover external surges. Extreme external surges may damage the product.

UT-ML□ Mechanical Interlock Unit

Application

Model	Applicable magnetic contactor model
UT-ML11	S-T10, T12, T20
UN-ML21 (Note 1)	S-T21, T25, T32

Note 1: Use UN-ML21 of the MS-N Series as the mechanical interlock unit for S-T21 to T32.

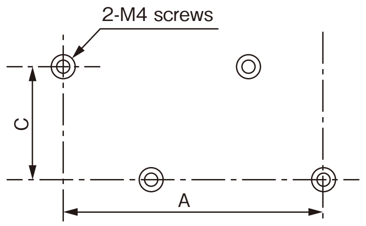
Specifications

Model	UT-ML11
Rated insulation voltage	690V
Rated impulse withstand voltage	6kV
Rated frequency	50/60Hz
Pollution degree	3
Terminal screw size/type	M3.5 cross slot screw with pressure plate
Applicable electric wire size[ϕmm,mm²]	ϕ1.6 0.75 to 2.5
Applicable crimp lug size	1.25-3.5 to 2-3.5
Terminal screw tightening torque[N·m]	0.9 to 1.5

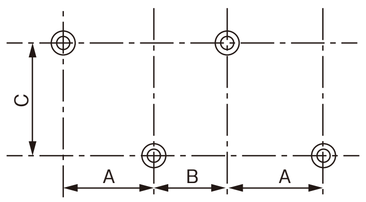
Mounting

Hole drilling dimension

(Drilling of holes is not required when mounting the IEC 35mm rail mountable model is mounted to the IEC 35mm rail for reversing.)



Model	Applicable frame	Dimension[mm]		
		A±0.2	B±0.2	C±0.3
UT-ML11	T10	74	–	60

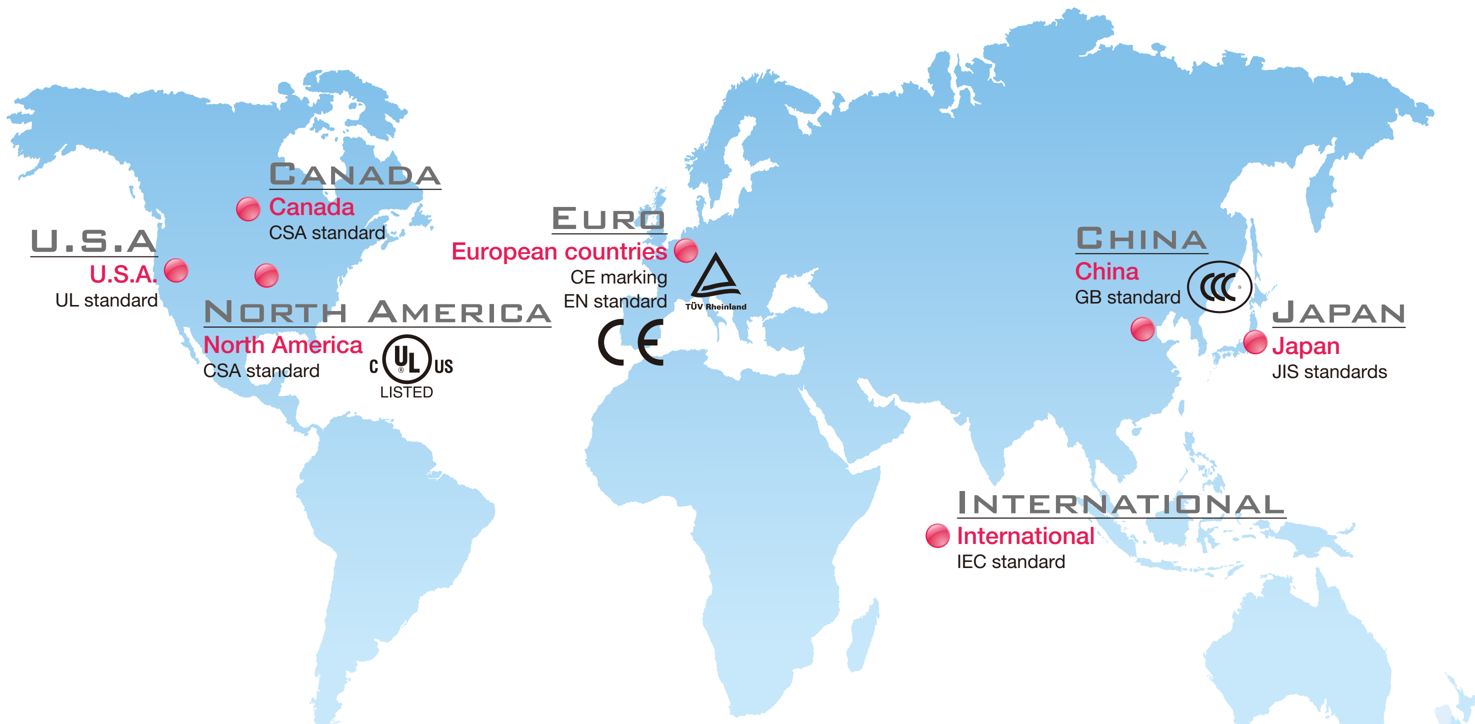


Model	Applicable frame	Dimension[mm]		
		A±0.2	B±0.2	C±0.3
UT-ML11	T12,T20	35(30)	19(24)	60(60)
UN-ML21	T21,T25	54(54)	19(19)	60(56)
	T32	30	23	60

Note: The value in brackets is also allowed for mounting.

MEMO

We support your overseas business.



■Our standard products comply with the domestic standards as well as various overseas standards and are certified to meet all the standards.

Type	Model name	Applicable standard			Safety certification standard		EC directive	Certification body	CCC
		JIS	IEC	EN	UL	CSA	CE Marking	TÜV (Note1)	GB
		Japan	International	Europe	U.S.A.	Canada	Europe		China
					c UL us LISTED (Note2)		CE	TÜV Rheinland	CCC
Magnetic Contactors	S-T10 to T32	◎	◎	◎	◎	◎	◎	◎	◎
Open Type Magnetic Starters	MSO-T10KP to T25KP	◎	◎	◎	◎	◎	◎	◎ (Note)	◎
Thermal Overload Relays	TH-T18KP to T25P	◎	◎	◎	◎	◎	◎	◎	◎

Note1: The Magnetic Starters will be certified under each type name of the Magnetic Contactors and the Thermal Overload Relays on the condition that the Magnetic Contactors and the Thermal Overload Relays are used in combination.
Note2: For the UL standard for the U.S.A. & Canada, refer to the table on the right.

UL Approval for U.S.A. and Canada

■ Magnetic Contactor

Type	Main Contact: Maximum Horsepower Rating [HP] Single Phase 110-120V	200-208V	220-240V	440-480V	550-600V	Polyphase 110-120V	200-208V	220-240V	440-480V	550-600V	Maximum Continuous Current Rating [A]	Auxiliary Contact (Rating Code)	Mark
S-(2X)T10	1/2	1	1-1/2	2		1	3	3	5		13	A600 and Q300	c UL us LISTED File No. E58968 CCN: NLDX (U.S.A.) NLDX7 (Canada)
S-(2X)T12	1/2	1	1-1/2	2		1	3	3	7-1/2		20		
S-(2X)T20	1	2	2	3		2	3	5	7-1/2				
S-(2X)T21	1	—	3	5		2	5	5	10		30		
S-(2X)T25	2	—	3	7-1/2		3	7-1/2	7-1/2	15				
S-(2X)T32	2	5	5	10	7-1/2	5	10	10	20	15	32.5	—	

■ Mechanical Interlock

UT-ML11 : Approval as Unlisted Component to be suitable for Type S-2XT10, -2XT12 or -2XT20 Reversing Magnetic Contactor

■ Thermal Overload Relay

Type	Heater Designation	FLA Adjustable Range [A]	Magnetic Contactor to be coupled	Connecting Bar for coupling	Trip Class	Auxiliary Contact (Rating Code)	Mark
TH-T18KP	0.12 A	0.1 - 0.16	S-(2X)T10, S-(2X)T12, S-(2X)T20	Unnecessary	10	C600	c UL us LISTED File No. E58969 CCN: NKCR (U.S.A.) NKCR7 (Canada)
	0.17 A	0.14 - 0.22					
	0.24 A	0.2 - 0.32					
	0.35 A	0.28 - 0.42					
	0.5 A	0.4 - 0.6					
	0.7 A	0.55 - 0.85					
	0.9 A	0.7 - 1.1					
	1.3 A	1 - 1.6					
	1.7 A	1.4 - 2					
	2.1 A	1.7 - 2.5					
	2.5 A	2 - 3					
	3.6 A	2.8 - 4.4					
	5A	4 - 6					
	6.6 A	5.2 - 8					
	9A	7 - 11					
	11A	9 - 13	S-(2X)T12, S-(2X)T20				
	15 A	12 - 18*1	S-(2X)T20				
TH-T25KP	0.24 A	0.2 - 0.32	S-(2X)T21, S-(2X)T25	UN-TH21		B600	
	0.35 A	0.28 - 0.42					
	0.5 A	0.4 - 0.6					
	0.7 A	0.55 - 0.85					
	0.9 A	0.7 - 1.1					
	1.3 A	1 - 1.6					
	1.7 A	1.4 - 2					
	2.1 A	1.7 - 2.5					
	2.5 A	2 - 3					
	3.6 A	2.8 - 4.4					
	5 A	4 - 6					
	6.6 A	5.2 - 8					
	9 A	7 - 11					
	11 A	9 - 13					
	15 A	12 - 18					
	22 A	18 - 26	S-(2X)T25				

Note : *1 - The available FLA rating is 16A or less.

■ Contactor Relay and Auxiliary Contact Block

Type	Auxiliary Contact (Rating Code)	Mark
SR-T5 SR-T9	A600 and Q300	c UL us LISTED File No. E58969 CCN: NKCR (U.S.A.) NKCR7 (Canada)
(UT-AX2) UT-AX4 (UT-AX11)		c RU us File No. E58969 CCN: NKCR2 (U.S.A.) NKCR8 (Canada)

■ Surge Absorber Unit for Operating Coil

Type	Rating, 50/60Hz	Mark
UT-SA21	24-48V 100-240V 346-480V	c RU us File No. E58969 CCN: NKCR2 (U.S.A.) NKCR8 (Canada)
UT-SA22	100-240V	
UT-SA23	100-240V	
UT-SA25	24-50V 100-240V	

Instruction for UL /CSA

■ Available Short Circuit Current Rating (SCCR) and Short Circuit Protection Device (S.C.P.D.)

Model	S.C.P.D. Fuse, Class K5 Max. Current Ratings	Available Short Circuit Current	S.C.P.D. Circuit Breaker Max. Current Ratings			S.C.P.D. Circuit Breaker Min. Interrupting Ratings			Available Short Circuit Current		
Max. Circuit Voltage	600V	600V	240V*1	480V*1	600V	240V*1	480V*1	600V	240V*1	480V*1	600V
S-T10/T12	30A	5kA	30A	30A	N/A	10kA	18kA	N/A	10kA	10kA	N/A
S-T20	70A		50A	50A							
S-T21	70A		50A	50A		10kA	50kA		10kA	35kA	
						50kA			35kA		
S-T25	100A		75A	75A		14kA			10kA		
						50kA			35kA		
S-T32	100A		75A	75A		14kA			10kA		
						50kA			35kA		

*1. Main circuit wires must be connected to contactor using applicable lugs shown in below table.

Model	Heater Desig.	Adjustable Range.Amps. / Max. Circuit Voltage	S.C.P.D. Fuse, Class K5 Max. Current Ratings 600V	Available Short Circuit Current 600V	S.C.P.D. Circuit Breaker Max. Current Ratings 240V*1	480V*1	600V	S.C.P.D. Circuit Breaker Min. Interrupting Ratings 240V*1	480V*1	600V	Available Short Circuit Current 240V*1	480V*1	600V
TH-T18KP	0.12A	0.10 - 0.16	15A	5kA	N/A						N/A		
	0.17A	0.14 - 0.22											
	0.24A	0.20 - 0.32											
	0.35A	0.28 - 0.42											
	0.5A	0.4 - 06											
	0.7A	0.55 - 0.85											
	0.9A	0.7 - 1.1											
	1.3A	1.0 - 1.6			15A	15A	N/A	10kA	18kA	N/A	10kA	10kA	N/A
	1.7A	1.4 - 2.0											
	2.1A	1.7 - 2.5											
	2.5A	2.0 - 3.0											
	3.6A	2.8 - 4.4											
	5A	4.0 - 6.0	20A										
	6.6A	5.2 - 8.0	30A		30A	30A							
	9A	7 - 11											
	11A *2	9 - 13											
	15A *3	12 - 18	40A		50A	50A							
TH-T25KP	0.24A	0.20 - 0.32	15A	5kA	N/A						N/A		
	0.35A	0.28 - 0.42											
	0.5A	0.4 - 0.6											
	0.7A	0.55 - 0.85											
	0.9A	0.7 - 1.1											
	1.3A	1.0 - 1.6			15A	15A	N/A	10kA / 50kA	50kA	N/A	10kA / 35kA	35kA	N/A
	1.7A	1.4 - 2.0											
	2.1A	1.7 - 2.5											
	2.5A	2.0 - 3.0											
	3.6A	2.8 - 4.4											
	5A	4.0 - 6.0	20A										
	6.6A	5.2 - 8.0	30A		30A	30A							
	9A	7 - 11	40A										
	11A	9 - 13	50A										
	15A	12 - 18	70A		50A	50A							
	22A *4	18 - 26	100A		75A	75A		14kA/50kA					

*1. Main circuit wires must be connected to contactor using applicable lugs shown in next table.
*2. 11A heater is applied to types S-T12 and S-T20.
*3. 15A heater is applied to type S-T20.
*4. 22A heater is applied to type S-T25.

⚠ WARNING To provide continued protection against a risk of fire and electric shock, the complete overload relay must be replaced if burnout of current element occurs.

Note1: This overload relay is adjustable and ambient compensated. Set the dial in the position corresponding to the motor full load current.
Note2: Trip rating is 125% of setting.

■ Applicable wire size, lug size and tightening torque

Model	S-T10/T12/T20			S-T21	S-T25	S-T21/T25	S-T21/T25	TH-T18KP		TH-T25KP	
Terminal	Main	Auxiliary	Control	Main		Auxiliary	Control	Main	Auxiliary	Main	Auxiliary
Screw size	M3.5	M3.5	M3.5	M4		M3.5	M3.5	M3.5	M3.5	M4	M3.5
Wire strip length L	10mm	10mm	9mm	11.5mm		11.5mm	9mm	10.5mm	10.5mm	10mm	10.5mm
Wire size (60/75℃) (copper only) (Sol./Str.)	14 - 12 AWG	14 AWG	14 AWG	14 - 10 AWG	14 - 8 AWG	14 AWG	14 AWG	14 - 12 AWG*1	14 AWG	14 - 8 AWG	14 AWG
Recommended Crimp Lug Size (JST Cat No.) *3	1.25-3.5 to 2-3.5 5.5-S3	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5	1.25-4 to 5.5-4	1.25-4 to 5.5-4 8-NK4	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5 5.5-S3	1.25-3.5 to 2-3.5	1.25-4 to 5.5-4 8-NK4	1.25-3.5 to 2-3.5
Connection to terminal Max. qty.	2 Wires or 2 Lugs per terminal *2										
Tightening torque	10.3 lb-in (1.17N・m)	10.3 lb-in (1.17N・m)	10.3 lb-in (1.17N・m)	15 lb-in (1.69N・m)		10.3 lb-in (1.17N・m)	10.3 lb-in (1.17N・m)	10.3 lb-in (1.17N・m)	10.3 lb-in (1.17N・m)	15 lb-in (1.69N・m)	10.3 lb-in (1.17N・m)

*1. The available current rating of 15A heater is 16A or less.
*2. Two conductors of the same size can be connected.
*3. Please use swaging tool which is recommended by JST.

⚠ WARNING When a 2-wire control is used to reset the automatic reset overload relay of a motor controller, the motor connected to the circuit may start automatically when the relay is in the automatic reset position.

Model	S-T32	
Terminal	Main	Control
Screw size	M4	M3.5
Wire strip length L	11.5mm	9mm
Wire size (60/75℃) (copper only) (Sol./Str.)	14 - 10 AWG 8 AWG *1	14 AWG
Recommended Crimp Lug Size (JST Cat No.) *3	1.25-4 to 5-5.4 8-NK4	1.25-3.5 to 2-3.5
Connection to terminal Max. qty.	2 Wires or 2 Lugs per terminal *2	
Tightening torque	15 lb-in (1.69N・m)	10.3 lb-in (1.17N・m)

*1. If it is necessary to apply 8AWG at the polyphase AC200-208V, it should be applied 75℃ copper wire only.
*2. Two conductors of the same size can be connected.
*3. Please use swaging tool which is recommended by JST.

Model	SR-T5/T9	
Terminal	Auxiliary	Control
Screw size	M3.5	M3.5
Wire strip length L	10mm	9mm
Wire size (60/75℃) (copper only) (Sol./Str.)	14 AWG	14 AWG
Recommended Crimp Lug Size (JST Cat No.) *2	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5
Connection to terminal Max. qty.	2 Wires or 2 Lugs per terminal *1	
Tightening torque	10.3 lb-in (1.17N・m)	10.3 lb-in (1.17N・m)

*1. Two conductors of the same size can be connected.
*2. Please use swaging tool which is recommended by JST.

Type Codes

* For the information on type codes for orders, check the note in Order Procedure.

Magnetic Starters

MSO — 2× T10 BC KP SA YS

Basic type	
MSO	AC operated type

Non-Reversing/Reversing	
No code	Non-Reversing
2×	Reversing

Frame size
T10-T25

Finger protection		Applicable model
No code	Standard	T10-T25
BC	With fast wiring terminal	

Reset method of Thermal Overload Relays	
No code	Manual reset (standard)
AR	Automatic reset

Combined Thermal Overload Relays	
No code	With 2-element Thermal Overload Relays
KP	With 3-element Thermal Overload Relays
SR	With 2-element delay trip type Thermal Overload Relays
KPSR	With 3-element delay trip type Thermal Overload Relays
FS	With 2-element quick trip type Thermal Overload Relays
FSKP	With 3-element quick trip type Thermal Overload Relays

Operation coil and operation circuit specification		Applicable model
No code	Standard	T10-T25
SA	With surge absorber	

Special environment		Applicable model
No code	Standard	T10-T25
YS	Anticorrosion treatment specification	

Magnetic Contactors

S — 2× T10 BC SA

Basic type	
S	AC operated type

Non-Reversing/Reversing	
No code	Non-Reversing
2×	Reversing

Frame size
T10-T32

Finger protection		Applicable model
No code	Standard	T10-T32
BC	With fast wiring terminal	

Operation coil and operation circuit specification		Applicable model
No code	Standard	T10-T32
SA	With surge absorber	

With special auxiliary contact		Applicable model
No code	Standard	All series
JH	With large rated auxiliary contacts	T10-T25

Thermal Overload Relays

TH — T18 BC KP YS

Basic type	
TH	Thermal Overload Relays

Frame size
T18, T25

Note: Frame size classification by mounting type
Magnetic Starters for independent mounting → T25
For Magnetic Starters → T18

Reset method of Thermal Overload Relays	
No code	Manual reset (standard)
AR	Automatic reset

Combined Thermal Overload Relays	
No code	2-element Thermal Overload Relays
KP	3-element Thermal Overload Relays
SR	2-element delay trip type (with saturable reactor)
KPSR	3-element delay trip type (with saturable reactor)
FS	2-element quick trip type
FSKP	3-element quick trip type

Finger protection		Applicable model
No code	Standard	T18, T25
BC	With fast wiring terminal	

Special environment		Applicable model
No code	Standard	T18, T25
YS	Anticorrosion treatment specification	

Contactor Relays

SR — T5 BC SA

Basic type	
SR	AC operated type

Frame size
T5, T9

Finger protection		Applicable model
No code	Standard	T5, T9
BC	With fast wiring terminal	

Operation coil and operation circuit specification		Applicable model
No code	Standard	T5, T9
SA	With surge absorber	

With special contact		Applicable model
No code	Standard	T5, T9
JH	With large rated auxiliary contacts	

Optional Units

UT — AX 4 BC

Basic type	
UT	Optional units

Unit type		Application
AX	Additional auxiliary contacts	UT
ML	Mechanical interlocks	UT
SA	Surge absorbers	UT

Finger protection		Applicable model
No code	Standard	All units
BC	With fast wiring terminal	AX, ML

Unit specification, applicable model, and others
1 to 2-digit number

Order Procedure

Note

For orders, specify products as shown below. Insert a space where ▲ is present.
If adding multiple two-character codes (such as SA, BC, and KP) after a frame size (T10 or others) of type name, specify them in alphabetical order of the first letters. (Example: MSO-T10BCKPSA)
(If they are not in alphabetical order, the type code is automatically changed.)

Standard (AC operated) Magnetic Starters

●MSO-(2X)T type (Open type)

Model name		Heater designation (setting current)		Operation coil designation or operation circuit voltage		Auxiliary contact
MSO-T21	▲	3.7kW	▲	AC200V		
MSO-T10	▲	9A	▲	AC200V	▲	1B
Refer to page 12,32.		Select from page 16.		Select coil designation from pages 13 and 14 or specify the working operation circuit voltage.		Specify the auxiliary contact arrangements. from page 12

Standard (AC operated) Magnetic Contactors

●S-T and S-2XT types

Model name		Operation coil designation or operation circuit voltage		Auxiliary contact
S-T20	▲	AC200V	▲	2A
S-T20	▲	AC100V50Hz		
Refer to page 12,32.		Select coil designation from pages 13 and 14 or specify the working operation circuit voltage.		Specify the auxiliary contact arrangements. from page 12

Magnetic Starters with 3-element Thermal Overload Relays

●MSO-T□KP type

Model name		Heater designation (setting current)		Operation coil designation or operation circuit voltage		Auxiliary contact
MSO-T10KP	▲	9A	▲	AC200V		
Refer to page 12,32.		Select from page 16.		Select coil designation from pages 13 and 14 or specify the working operation circuit voltage.		Specify the auxiliary contact arrangements. from page 12

With fast wiring Terminal

●MSO-T□BC type

Model name		Heater designation (setting current)		Operation coil designation or operation circuit voltage		Auxiliary contact
MSO-T12BC	▲	2.2kW	▲	AC200V		
Refer to page 32.		Select from page 16.		Select coil designation from pages 13 and 14 or specify the working operation circuit voltage.		Specify the auxiliary contact arrangements. from page 12

●S-T□BC type

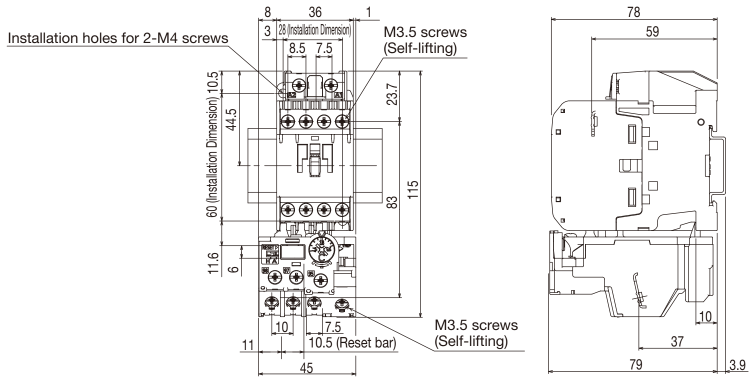
Model name		Operation coil designation or operation circuit voltage		Auxiliary contact
S-T12BC	▲	AC200V		
S-T12BC	▲	AC100V50Hz	▲	2A
Refer to page 32.		Select coil designation from pages 13 and 14 or specify the working operation circuit voltage.		Specify the auxiliary contact arrangements. from page 12

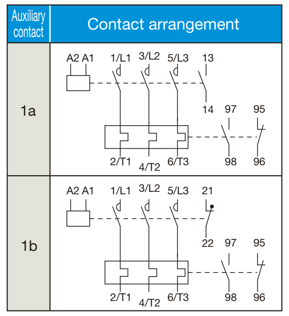
MEMO

Outline Drawing, Contact Arrangement

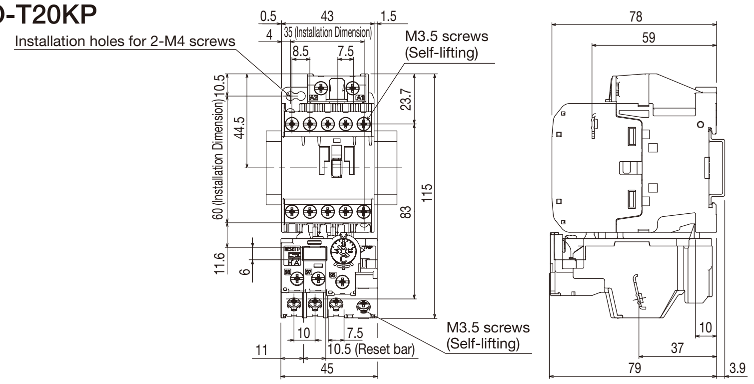
Magnetic Starters

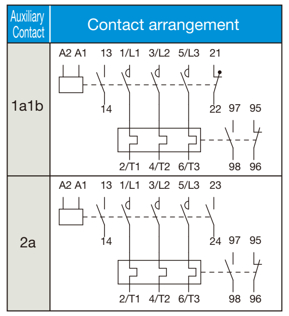
●MSO-T10KP



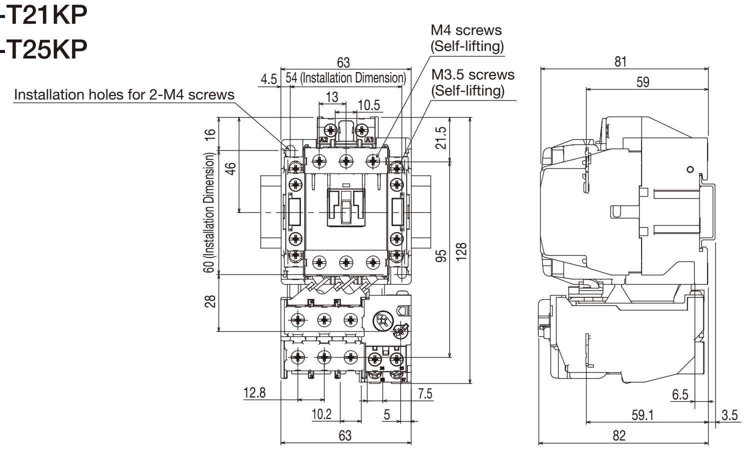


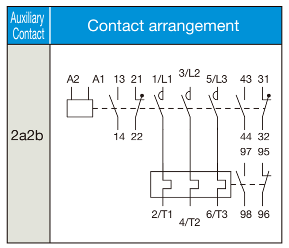
●MSO-T12KP
●MSO-T20KP



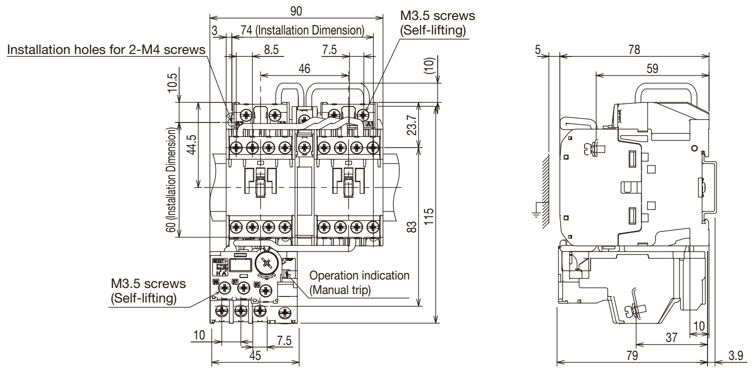


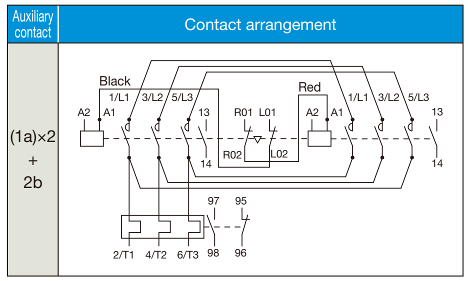
●MSO-T21KP
●MSO-T25KP



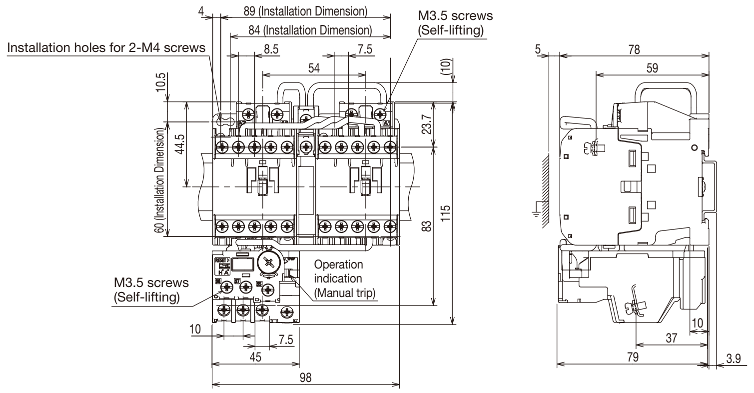


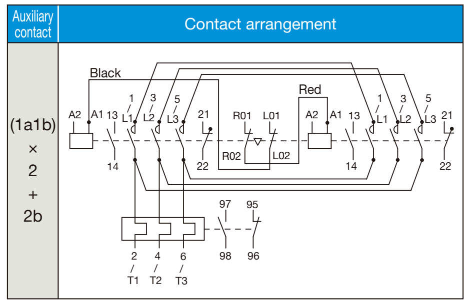
●MSO-2XT10KP



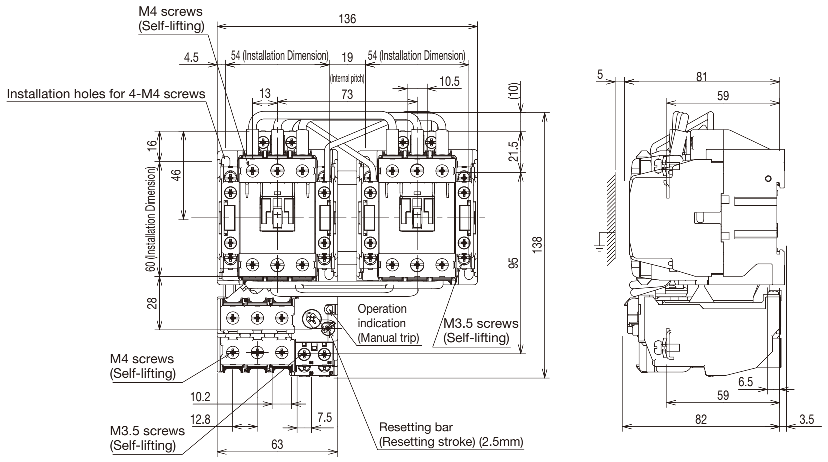


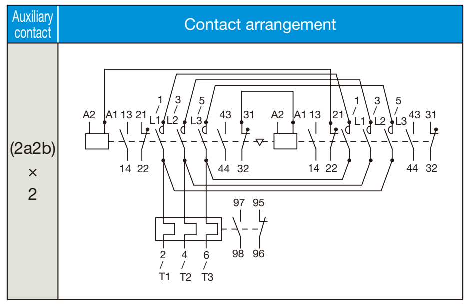
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●MSO-2XT20KP





●MSO-2XT21KP
●MSO-2XT25KP

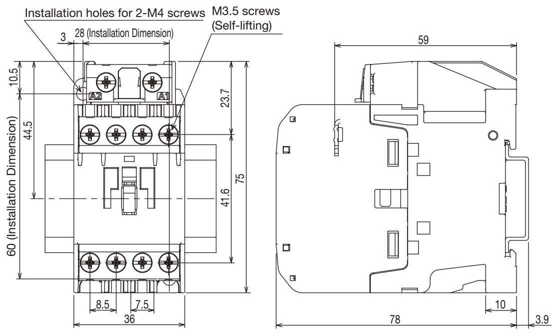


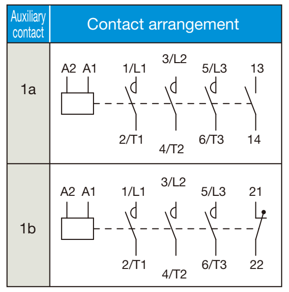


Outline Drawing, Contact Arrangement

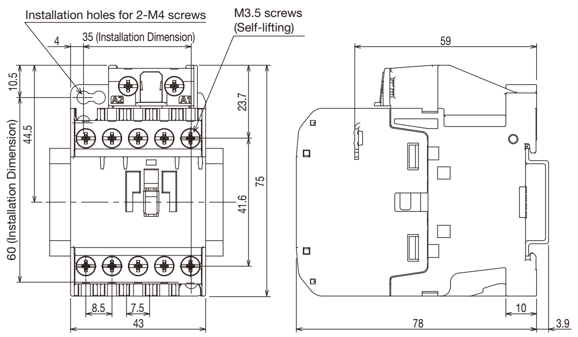
Magnetic Contactors

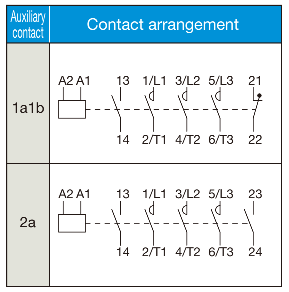
●S-T10



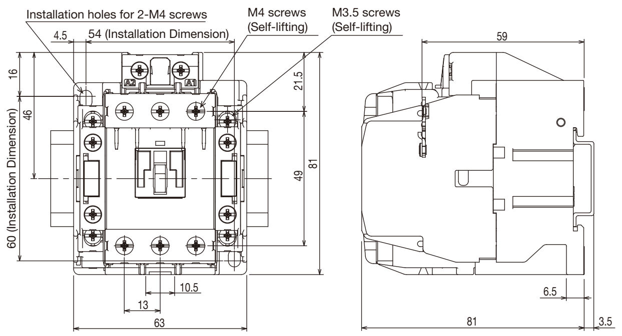


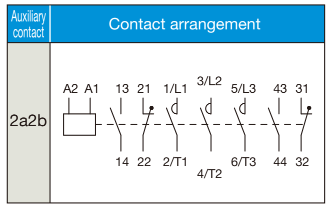
●S-T12
●S-T20



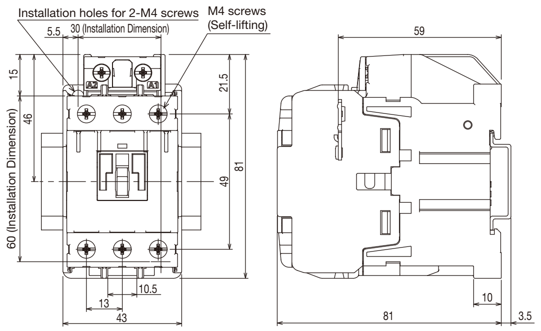


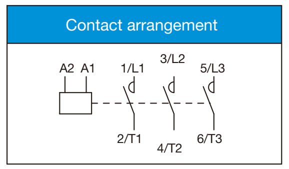
●S-T21
●S-T25



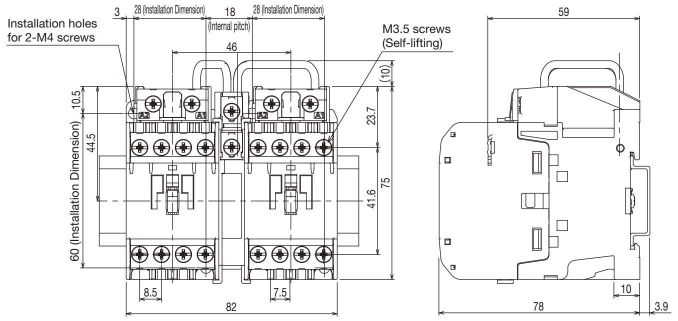


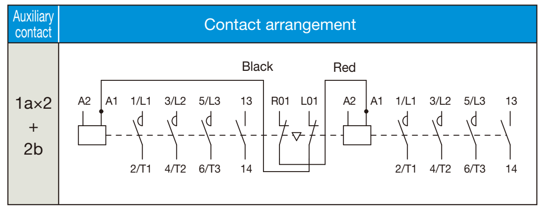
●S-T32



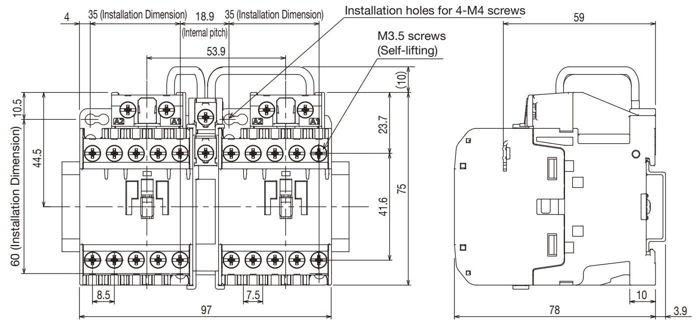


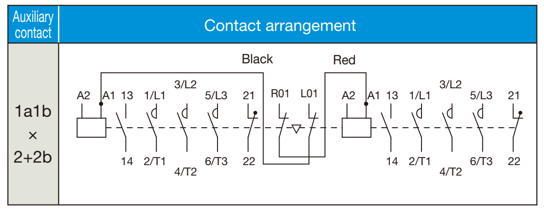
●S-2×T10



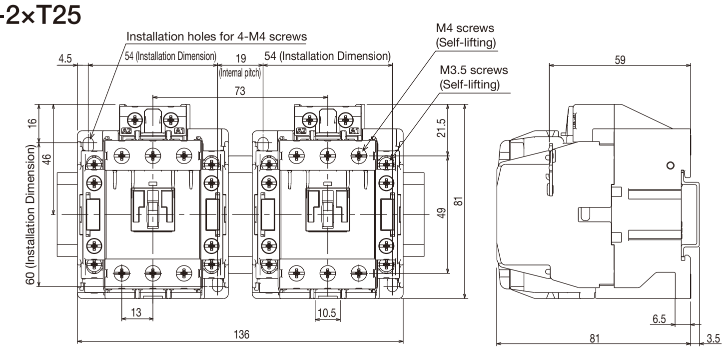


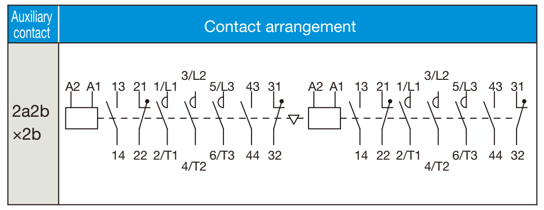
●S-2×T12
●S-2×T20



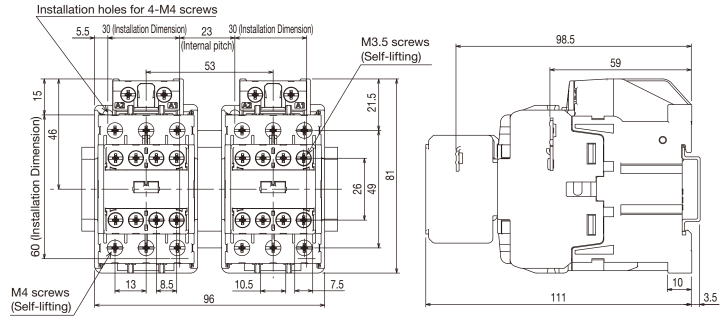


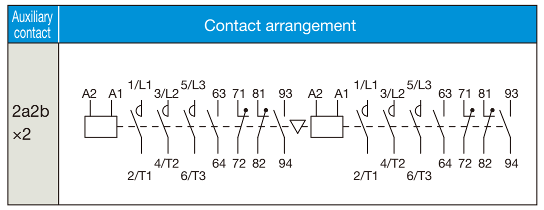
●S-2×T21
●S-2×T25





●S-2×T32

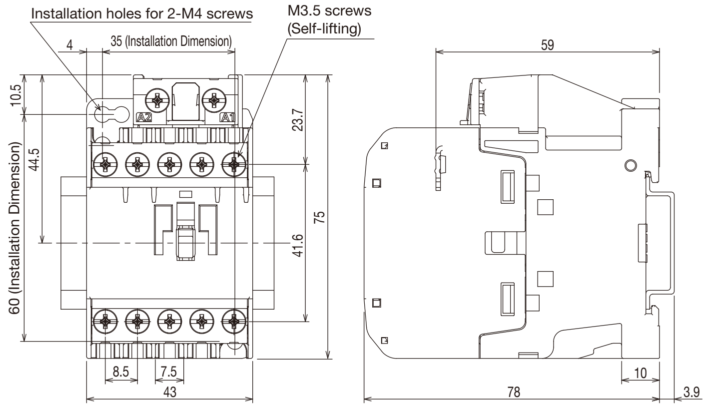




Outline Drawing, Contact Arrangement

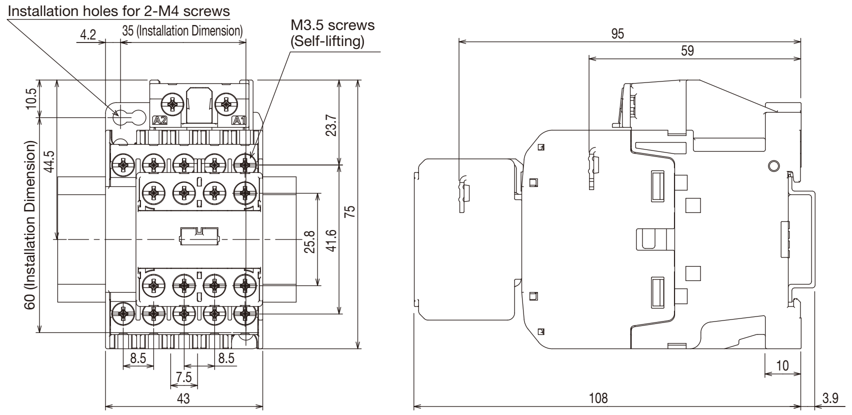
Contactor Relays

●SR-T5



For contact arrangement and contact allocation, see Page 22.

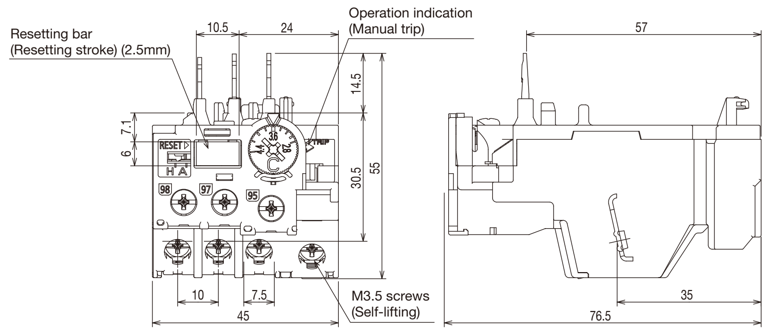
●SR-T9

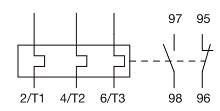


For contact arrangement and contact allocation, see Page 22.

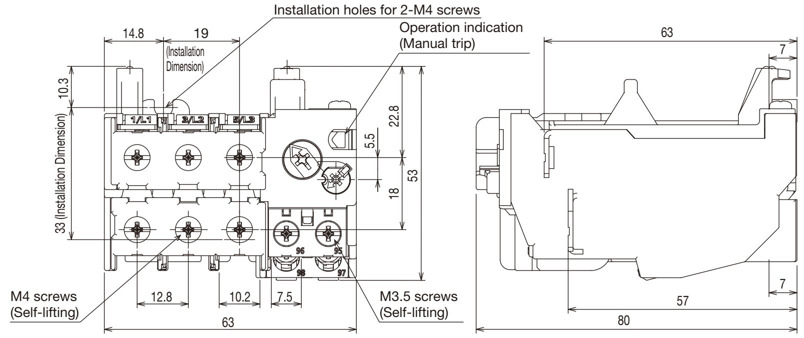
Thermal Overload Relays

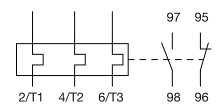
●TH-T18KP



Auxiliary contact	Contact arrangement
TH-T18KP	

●TH-T25KP



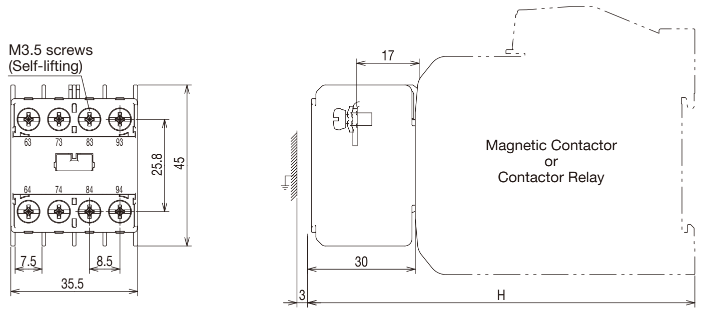
Auxiliary contact	Contact arrangement
TH-T25KP	

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Warranty and Safety

Outline Drawing, Contact Arrangement

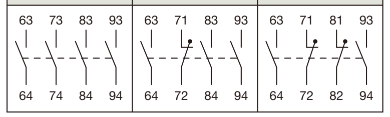
Optional Units

●UT-AX4



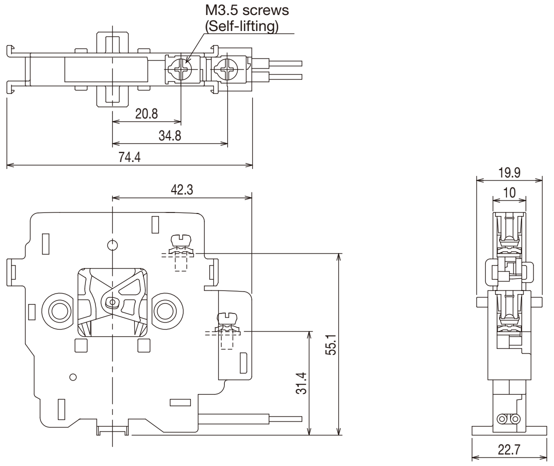
Application	Applicable model	Dimension H
Magnetic Contactor	S-T10, T12, T20	108
	S-T21, T25, T32	111
Contact Relay	SR-T5	108

Contact arrangement		
4a	3a1b	2a2b

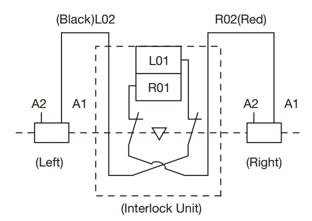


Note: The contact arrangement 4a is shown in the figure above.

●UT-ML11



Contact arrangement



MEMO

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Note

Precautions for Use

⚠Be sure to periodically check the Magnetic Starters and apply danger prevention measures on the sequence of important circuits. (The Magnetic Starters contacts may suffer from defective continuity, welding, and burning.)

⚠When performing installation, wiring, and maintenance & inspection, be sure to disconnect the Magnetic Starters from the power supply. It may cause electric shock. In addition, the malfunction attributable to vibration, impact, and false wiring may exert serious results (machine malfunction, short-circuiting of power supply, etc.) on the Magnetic Contactors.

●Performance

The performance described in this catalog is based on the result of a test conducted under the conditions specified in the Standard (IEC60947-4-1 "Low-voltage switchgear and controller" etc.). If actual use condition is different from this test condition, the user must evaluate the condition (by using an actual device).

●Use condition

Although the device can operate without any problem when under the conditions described in this chapter, be careful about the following matters.

(1) Ambient temperature
Even when the device is used in accordance with normal usage, deterioration of the insulation will progress.
In particular, as the ambient temperature increases, the insulation life is shortened. In general, it is said that every time the ambient temperature increases by 6 to 10°C, the insulation life decreases by half (Arrhenius law). In a case where the ambient temperature is high and voltage exceeding the rated voltage is continuously applied to coil, the coil temperature increases and life may be shortened dramatically.

(2) Vibration/Impact
Although vibration of 19.6m/s² and impact of 49m/s² do not cause contact malfunction, even when the vibration and impact are below these values but are applied continuously, fatigue failure may cause some trouble.
In particular, please note that the resonance of an installed board may exert a large vibration on the product.

Usage environment

(1) Ambient temperature : -10°C to 40°C
(Applied to the outside of the control board) Average daily atmospheric temperature: 35°C (Max.), Average yearly atmospheric temperature: 25°C (Max.)
(2) Maximum temperature of the inside of the control board : 55°C However, the ambient temperature of boxed MS type is 40°C (Average yearly temperature of the inside of the control board is 40°C or less.).
Please note that the operating characteristics of the Magnetic Contactors and Thermal Overload Relays may vary with the ambient temperature.
(3) Ambient temperature : 45% to 85% RH However, dew condensation and freezing should be avoided.
(4) Height above sea level : 2000 m or less
(5) Vibration : 10 to 55 Hz, 19.6 m/s² or less
(6) Impact : 49 m/s² or less
(7) Atmosphere : Inclusion of dust, smoke, corrosive gas, moisture, salt content and the like in the atmosphere should be avoided as much as possible.
Please note that continuing to use the device in a closed condition for a long period may cause contact failure.
Never use the device under an atmosphere that contains flammable gas.
(8) Storage temperature/Relative humidity : -30°C to 65°C 45% to 85% RH However, dew condensation and freezing should be avoided.
The storage temperature is ambient temperature during transportation or storage and should be within the usage temperature when starting to use the device.

Mounting

●Direct mounting

(1) The device should be mounted in a dry location low in dust and vibration.
(2) The normal mounting direction is the direction shown in Fig. 1 on a vertical surface, but mounting the device at an inclination angle of up to 30 degrees in either direction is allowed. (Fig. 2)
(3) Mounting the device on a floor or ceiling is not allowed. (Mounting the device on a floor or ceiling may affect the continuity performance, operation performance, and durability of the contact.)
(4) If mounting the device in a horizontal orientation cannot be avoided, be sure to rotate the device by 90 degrees in a counterclockwise direction from the normal mounting direction as shown in figure 3 when mounting it.
If the device is mounted in a horizontal orientation, its characteristic is nearly unchanged but mechanical durability may be deteriorated. Horizontal mounting of reversing type is not allowed.

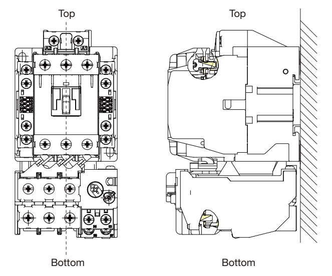


Fig.1. Normal mounting

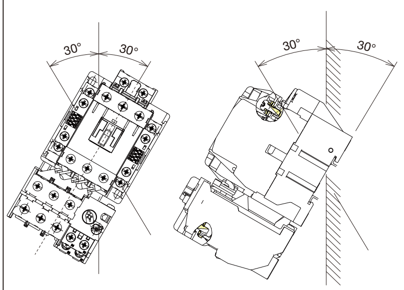


Fig.2. Inclined mounting

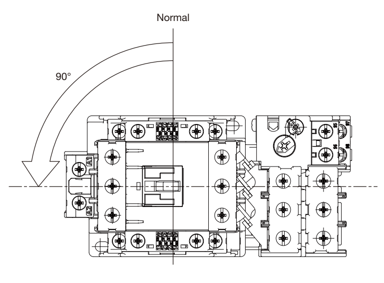


Fig.3. Horizontal mounting

●Tightening torque of mounting screw

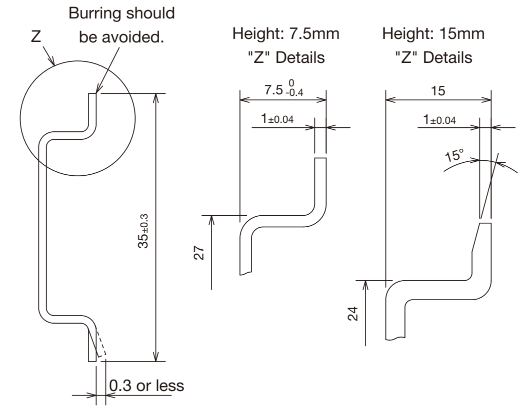
The device should be mounted by force of tightening torques shown in the right table.

Screw size	Tightening torque of mounting screw N·m
M4	1.2 to 1.9

●Mounting of IEC 35mm wide rail

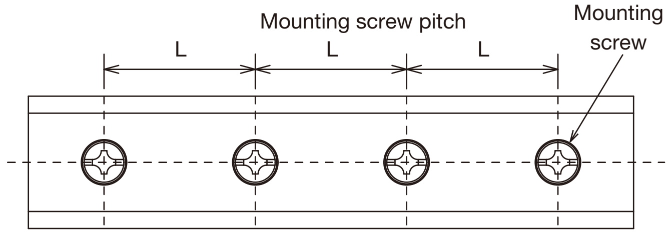
(1) T10 to T32 types and SR-T type are standard devices allowed to be mounted on an IEC 35mm wide rail.
(2) DIN, EN, IEC, and JIS C2812 standards-compliant 35mm wide rails come in two types: 7.5mm and 15mm in rail height. Their shapes and dimensions are as shown in the figure below.

	Rail	Rail specifications
1	TH35-7.5	Rail width: 35mm, Rail height: 7.5mm
2	TH35-15	Rail width: 35mm, Rail height: 15mm



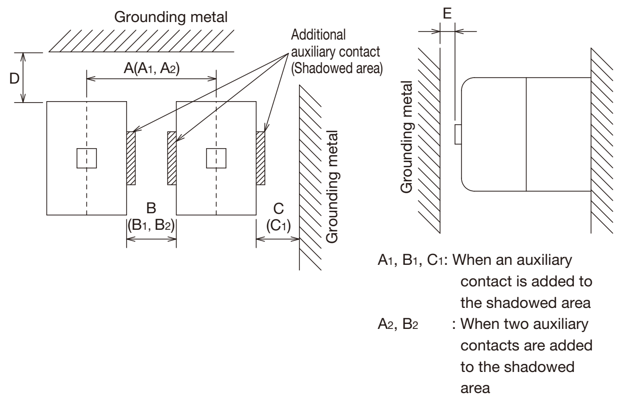
(3) Maximum pitch of rail mounting screw L(mm)
When mounting a rail on a surface of the board, be sure to keep the rail mounting screw pitch below the dimension shown in the following table in order to secure sufficient mechanical strength.

Frame / Rail	S-T10, T12, T20, T21, T25, T32	SR-T5,T9
TH35-7.5	250	
TH35-15	500	



●Mounting space and arc space

When mounting the Magnetic Contactors side by side, be sure to keep the devices isolated by a distance longer than the dimension shown in the following table. Also, the Magnetic Contactors and adjacent grounding metal should be isolated by a distance longer than the dimension shown in the following table. The content described in ( ) is applied when additionally mounting auxiliary contacts.
Although an arc space is not required in a position above the Magnetic Contactors, it is recommended to provide a space longer than the E dimension shown in the following table in consideration of the product movement caused by variation in depth dimension of Magnetic Contactors and the vibration produced when turning on or releasing the contactor.



Mounting space and arc space

<table>
<tr><th rowspan="2">Frame</th><th colspan="4">Minimum mounting space</th><th rowspan="2">Arc Space (Note 1)</th><th rowspan="2">Upper mounting space E</th></tr>
<tr><th>A(A1, A2) dimension [mm]</th><th>B(B1, B2) dimension [mm]</th><th>C (C1) dimension [mm]</th><th>D dimension [mm]</th></tr>
<tr><td>S-T10</td><td>41 (A1 = 53, A2 = 65)</td><td rowspan="7">5 (Note 2) (B1 = 17, B2 = 29)</td><td rowspan="7">10 (C1 = 22)</td><td rowspan="8">15</td><td rowspan="8">0</td><td rowspan="7">5 (Note 3)</td></tr>
<tr><td>S-T12</td><td rowspan="2">48 (A1 = 60, A2 = 72)</td></tr>
<tr><td>S-T20</td></tr>
<tr><td>S-T21</td><td rowspan="2">68 (A1 = 80, A2 = 92)</td></tr>
<tr><td>S-T25</td></tr>
<tr><td>S-T32</td><td>48 (A1 = 60, A2 = 72)</td></tr>
<tr><td>SR-T5</td><td>48 (A1 = 60, A2 = 72)</td></tr>
<tr><td>SR-T9</td><td>48</td><td>5 (Note 2)</td><td>10</td><td>3</td></tr>
</table>

Note 1. The value of this arc space is a value of IEC and JIS Standards-based closed circuit shut-off capacity test.
Note 2. Although the B dimension of T10 to T32 allows closely-attached mounting, when continuing to apply current to the device or when mounting a product high in open/close frequency and high utilization on the same rail, the device life may be shortened in terms of temperature increase and impact, so please keep the space between the devices over the minimum value shown in the above table as much as possible when mounting them.
Note 3. E dimension is 3mm when mounting UT-AX2 or UT-AX4 with contactors.

About Handling Note

Connection

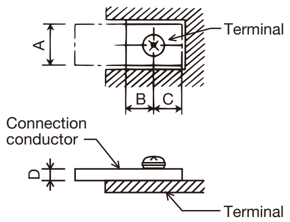
●Applicable electric wire size and tightening torque and terminal dimension of terminal screw

⚠This may cause overheating or fire. Be sure to properly keep the tightening torque and periodically re-tighten the screw.
However, please note that tightening the screw under the status where oil is adhered to the terminal portion may damage the terminal screw even within the existing tightening torque. Electric wires should be properly connected according to the electric wiring diagram. Tightening the terminal screw should be properly conducted within the tightening torque shown in the right table. Insufficient tightening of the terminal screw may cause overheating or cause the electric wire to drop off. Excessive tightening torque may damage the tightening screw. Adhesion of rock paint, thermo label, etc. to electric wire connection or contact may cause heat generation due to defective continuity, so this is very dangerous.

The main circuit terminals of T10 to T32 and TH-T18/T25 types are allowed to be connected via any of single wire, stranded wire, and crimp lug. The main circuit terminals and operating circuit terminals of T10 to T32 and TH-T18/T25 types are self-up terminals, which facilitate wiring.

Model	Terminal dimension and size/type of screw				Applicable electric wire size [ϕmm, mm²]		Connection conductor thickness (D) [mm]	Applicable crimp lug size (JST Cat No.)		Tightening torque of terminal screw [N·m]	
Standard type Contactor Relays Magnetic Contactors Thermal Overload Relays	Main circuit			Operating circuit							
	Dimension of terminal portion A x B x C [mm] (Note 1)	Screw size	Screw type	cross slot screw with pressure plate	Main circuit	Operating circuit	Main circuit (Note 1)	Main circuit	Operating circuit	Main circuit	Operating circuit
SR-T5, T9	–	–	–	M3.5x7.6	–		–	–		–	
S-T10, T12, T20	7.5×3.7×4.5	M3.5x7.6	cross slot screw with pressure plate	M3.5x7.6	ϕ1.6 0.75 to 2.5	ϕ1.6 0.75 to 2.5	1.6	1.25-3.5 to 2-3.5 5.5-S3	1.25-3.5 to 2-3.5	0.9 to 1.5	0.9 to 1.5
S-T21, T25, T32	10.5×5.2×5.5	M4x10.5		M3.5x7.6	ϕ1.6 - 2.6 1.25 to 6		3	1.25-4 to 5.5-4		1.2 to 1.9	
TH-T18 (Load side)	7.5×4×4	M3.5x7.6	cross slot screw with pressure plate	M3.5x7.6	ϕ1.6 0.75 to 2.5	ϕ1.6 0.75 to 2.5	2	1.25-3.5 to 2-3.5 5.5-S3	1.25-3.5 to 2-3.5	0.9 to 1.5	0.9 to 1.5
TH-T25 (Power side / Load side)	10.2×6.8×5/ 10.2×5.7×5	M4x10.5/ M4x10.5		M3.5x7.6	ϕ1.6 - 2.6 1.25 to 6		2.5	1.25-4 to 5.5-4		1.2 to 1.9	

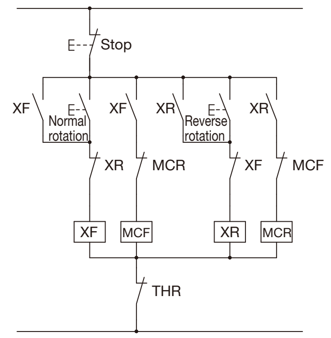
Note 1: The dimension of the main circuit terminal is a dimension for board conductor wiring. (See the right diagram) The board conductor thickness (D dimension) must be below the allowable connection conductor thickness stated above because of the length of the terminal screw. In case of wiring with two boards used, the total value of two boards must be below the value (D dimension) shown in the table.
Note 2: In each terminal, two wires or two crimp lugs are allowed to be connected.
Note 3: The cross slot screws with pressure plate of T Series and those of N or other Series are same in size but different in pressure plate dimension, so please avoid the mixed use of such screws. This may break the insulation barrier or make the wire likely to fall out.
Note 4: When using IEC60529-based finger safe specification, be sure to use an insulation tube-attached crimp lug.
Note 5: Tightening the3 terminal screw excessively without wiring may break the screw and consequently disable the tightening, so please avoid such excessive tightening.
Note 6: Operational circuits are coil terminals of magnetic contactors and control circuit terminals of Thermal Overload Relays.
Note 7: Please use swaging tool which is recommended by JST.



●Application to a circuit exceeding 380V

(1) When applying MSO, S-T10, T12, T20, SR-T5, T9, and TH-T18 types to a circuit exceeding 380V to set a crimp lug wiring, please use an insulating tube-attached crimp lug.

(2) When applying such parts to a Reversing type circuit exceeding 500V, please use an SR-T type Contactor Relays (XF, XR) as shown in the right figure to set the switching time allowance.



In case of Reversing type circuit exceeding 500V

●Wiring direction

Although the upper terminal side is usually set to the power supply side when wiring, the lower terminal side may be set to the power supply side when it is unavoidable due to some reason of the board wiring. However, the mounting direction must be in accordance with the description on Page 44.

Operating circuit

⚠Applying a low voltage that does not operate the Magnetic Contactors to the operating circuit may cause overcurrent to the coil, which may cause the coil to be burned in a short time.

⚠If the operating circuit wiring is too long, when the coil's instantaneous current flows, the wiring impedance may cause a reduction in the coil voltage, so that the operating circuit may fail to be activated. And, the stray capacitance of the wired line may cause the coil's excitation not to be released even when releasing the excitation.

●Power supply voltage variation range and voltage drop of the operating circuit

(1) Operating voltage
When the rated voltage and frequency are applied to the coil at an ambient temperature of 40°C (Inside temperature of the board: 55°C), the device operates without any problem at 85 to 110% of the rated voltage of the coil after the temperature increases and becomes saturated.

(2) Voltage drop
Even when the coil is excited at the rated voltage and the voltage drops to 65% of the rated voltage (first 1 to 2 cycles; however in case of 0.1 second or more, 70%) when the main contact is contacted, contact welding does not occur at a current ten times the rated operational current, allowing the device to operate without any problem.

(3) Voltage/Frequency and coil rating of operating circuit
The voltage/frequency of the operating circuit and the same of the operation coil must be matched.
Applying a voltage exceeding 100% of the rated voltage to the operating circuit when using the coil may acceleratedly deteriorate the coil insulation and consequently reduce mechanical durability, so set the coil's average voltage to 95 to 100% of the rated voltage when using the coil.

Application to special environment

⚠Please note that the operating characteristics of the magnetic contactor and thermal overload relay may vary with the ambient temperature.

●High temperature

When using Magnetic Starters or Magnetic Contactors at high ambient temperature, the temperature may mainly affect the insulation life (continuous electric conduction life) of the operation coil and the aging variation of the molding component.
MSO and S-T type without a box are standard products available even at the inside temperature of 55°C.

●Low temperature

Although the Magnetic Contactors may be transported to a cold region or used in such a cold region or under cold conditions such as those found in a refrigerator with the contactor incorporated in a switchboard, the S-T type Magnetic Contactors is applicable as a standard product. Also, MSO-T type Magnetic Starters and TH-T type Thermal Overload Relays of low temperature specification are not manufactured.
Applicable temperature range of low-temperature-based products: -50 to 55°C (Operating temperature)
-60 to 65°C (Storage temperature)

●Corrosive gas

S-T type Magnetic Contactors is of corrosion resistance-increased specification as a standard product.
Corrosive gases that exist in an environment with an Magnetic Starters or Magnetic Contactors used are gases such as sulfurous acid (SO_2), hydrogen sulfide (H_2S), chlorine (Cl_2), and ammonia (NH_3), and conductive portions can be protected by plating a metal resistant to such gases on the portion. However, because there is no adequate corrosion prevention method for the contact, such gases may increase the contact resistance, resulted in increased temperature.
Additionally, if the environment contains some corrosive gas but is under dry condition, this may delay the progression of corrosion, so using the switchboard with the inside kept as dry as possible is also one of the corrosion prevention methods.
In the Magnetic Starters and Thermal Overload Relays, corrosion-prevented products (MSO-T□YS, TH-T□YS) of the specification with increased corrosion resistance to such corrosive gases are also manufactured.

●Dust

Magnetic Starters and Magnetic Contactors used in an iron foundry, construction site, or powder conveying machine tend to be subject to a relatively large amount of dust. When using the control board in such locations, the board must be dust-prevention-structured. Also, using the board under hermetically-sealed condition for a long period may cause contact failure.

●Export of the products to tropical regions

The environment of exported products which pass through tropical regions tends to be of high temperature and high humidity, and humidity is the environmental factor that affects the Magnetic Starters and Magnetic Contactors most severely. Humidity is the biggest rust-generating factor and the exported products must be in a structure resistant to humidity.
Therefore, it is recommended to put a moisture absorbent (Silica gel) in an amount of 3kg or more per m³; so as to lower the humidity.

[Notes for adopting the product]

Before purchasing and using our products, please confirm the following product warranty.

Period and scope of warranty

●Warranty period

(1) The warranty period for our products shall be one year after purchase or delivery to the designated location. However the maximum warranty period shall be 18 months after production, in consideration that the maximum length of distribution period is to be 6 months after shipping.

(2) This warranty period may not apply in the case where the use environment, use conditions, or the number of open/close operation times specifically impact the lives of products.

●Scope of warranty

(1) When any failure occurs during the above warranty period which is clearly our responsibility, we will replace or repair the failed portion of the product free of charge at the location of purchase or delivery.
Note that the "failure" mentioned here shall not include such items as scratches and discoloration which do not affect performance.

(2) In the following cases, even during the warranty period, charged repair services shall be applied.
① Failures caused by inappropriate conditions, environment, handling, and uses other than those specified in catalogs, instruction manuals or specifications.
② Failures caused by inappropriate installation.
③ Failures caused by the design of customer's equipment or software.
④ Failures caused by the customer tampering with our products such as reworks without our authorization.
⑤ Failures caused by the customer failing to correctly maintain or replace components such as spare parts, as specified by documents such as instruction manuals.
⑥ Failures caused by uses of the product other than ordinarily intended.
⑦ Failures caused by force majeure such as fire and abnormal voltage accidents, and natural disasters such as earthquake, wind and flood.
⑧ Failures caused by reasons that were unforeseeable by the level of technology at the time of shipment.

(3) The warranty that is mentioned here shall mean warranty of the unit of delivery, and any losses induced by the failures of delivered products shall be excluded from our warranty.

●Failure diagnosis

In principle, primary failure diagnosis shall be conducted by the customer. However this job, if requested by the customer, can be performed by us or our service company with charge. In this case, a service fee shall be charged to the customer in accordance with our price list.

Recommendation for renewal due to life

Our Magnetic Starters and Magnetic Contactors with contacts and mechanical parts have certain wear life in line with the number of switching operations, while our coil wires and electronic parts have aging degradation life influenced by the use environment and use conditions.
Regarding the use of our Magnetic Starters and Magnetic contactors, we recommend customers to renew the products every 10 years as a rule, provided that the products are used in line with the number of open/close operations specified by this catalog or the instruction manual.
We also recommend to renew devices other than the Magnetic Starters and Magnetic Contactors described in this catalog every 10 years as a rule.

Exemption from warranty related to opportunity or secondary losses.

Regardless of in or out of warranty period, loss of opportunity and lost earnings at the customer side caused by the failures of our products, any damages caused by special situation regardless of our foreseeability, secondary losses, accident compensation, damages on anything other than our products, compensation to jobs including replacement work, readjustment of field machinery equipment, startup test run, etc. performed by customers, and damages caused by any reasons for which we are not held responsible, shall be outside the scope of our compensation.

Exemption from warranty related to opportunity or secondary losses.

(1) The contents of products shown in this catalog are for your selection of models. When you actually use the product, read the "Instruction Manual" carefully beforehand and use correctly.
Please note that the external view or specifications that should not affect the model selection can change without preannouncement.

(2) When using a product listed in this catalog, you are required to accept that your use should not lead to any serious accident if by any chance the product develops any failures or errors, and, in the event any failure or error occurs, backup or fail-safe functions are in place outside the device by the system.

(3) The products described in this catalog are designed and manufactured as general products to be used for general industrial fields. For this reason, the products described in this catalog should not be used for the applications requiring special quality assurance systems, such as serious public uses as atomic power plants and other power plants owned by power companies, railway applications and government and public office applications.
Note, however, that the products shall be applicable to such uses if the use is limited and the customer agrees not to require specially high quality.
Furthermore, when the customer is investigating application for the uses where serious impact is foreseen to the human body and assets and therefore high reliability for security and control system is required, such as aviation, medical services, railways, combustion and fuel equipment, manned transportation equipment, entertainment facilities and security machines, please contact our representatives and discuss any necessary agreement or specifications.

Supply period of spare goods after production stop

(1) For the discontinuation of production, we will announce in such media as "Sales and Service" paper created by us.

[Notes for security related issues]

●Before performing the installation, wiring works, operation and maintenance/check for the products described in this catalog, make sure to read the "Instruction Manual" or "Notes for Use" attached to the product for correct usage.
●In spite of our continued efforts to enhance the quality and reliability of our product, the product can fail. The products described in this catalog can bring about serious results, such as malfunctions of machinery, short circuit at power supply, and catching fire), by the malfunction caused by vibration, physical shock and improper wiring. Pay special attention to avoid any secondary accidents such as injuries and fire, as the result of failures or malfunctions.
●When you find any questions or you need more details after reading this catalog, please contact your dealer or our company.

[For using the products described in this catalog, please observe the following items.]

⚠ Danger

●Make sure to disconnect the power before you perform installation, removal, wiring works, or maintenance/checking. There is a risk of receiving an electric shock or occurrence of a malfunction.
●When the product is energized, avoid touching or coming near the product, especially the terminals having electricity. There is a risk of receiving an electric shock or burn injury.

⚠ Notes

●Use the product in the use environment described in this catalog and Instruction Manual. Do not install the product in any abnormal environment with high temperature, high humidity, dust, corrosive gas or excessive vibration/shock. There is a risk of catching fire, malfunctions, electric shock or failure.
●Avoid applying shocks by dropping or falling the product during transportation and unpacking. This will lead to breakage or failure of products.
●Do not use the product when it has received damage during transportation, installation or wiring. This can cause fire or malfunctions.
●Make sure that only technicians qualified for electric work or wiring should perform installation, wiring works and maintenance/checking of the product.
●Make sure that no foreign objects such as dust, iron powder and wire chips enter the product during installation and wiring works. There is a risk of contact failures and malfunctions leading to damage or fire at the load.
●When you use mounting screws of the wrong size or use a small number of screws than specified, or when the mounting to the rail of IEC 35mm width is defective, there is a risk that the product may fall.
●When you apply wiring works, be sure to use the wire size that suits the applied voltage, flow current and inrush current, and to fasten wires with the correct torque as specified in this catalog or the instruction manual. Defective wiring can cause fires, accidents and failures.
●To terminal screws and mounting screws, apply the torque as we specify for tightening, and regularly apply retorquing. When the tightening torque is too large, the work can damage terminal screws or mounting screws. When the terminal screws or mounting screws slacken or are broken, they can cause overheat or fire, or the body can fall off to create serious accidents.
●Confirm the rated values and specifications, and make sure to use a product that meets the requirements. When you use a product exceeding the rated/specified values, it may cause insulation breakdown leading to earth fault or short circuit accidents, or create the cause of fire by overheat or breakdown due to inability to shutdown.
●When a product described in this catalog is to be used in a facility where a failure can lead to injury to the human body or serious damage to earnings, make sure to install some safety mechanism.
●Apply regular checks to the product and use safety measures on the sequence to the critical circuits. The contacts of Contactors and Magnetic Starters can develop defective conduction, weldingor burnout.
●Contactors and Magnetic Starters can create welding of contacts disabling the opening, due to such causes as switching operation for excessive current, abnormal wearing of contacts, chattering at operational instruction contacts, aging degradation and product life. Also the contacts may fail to open due to unexpected mechanical constraints other than contact adhesion. Since the disability of contact to open can cause the machine to go out of control, secure safety by assuming the mechanical constraints or contact welding leading to inability of open/close operations. There remains a risk of fire even when an overload protective device (Thermal Overload Relays) is provided.
●The example connection described in this catalog only shows a typical one to run a system. For the protection of each device and safety measures, the customer is requested to consider the connection for each system.
●Do not apply reworks to the product or disassemble the product. These may cause failures.
●When you dispose of the products, treat them as industrial waste products.

[Related Products]

PLC | MELSEC-Q Series Universal Model



Introducing the high-speed QCPU (QnUDVCPU) for faster processing of large data volumes.

◎Realize high-speed, high-accuracy machine control with various iQ Platform compatible controllers and multiple CPUs.
◎Easily connect to GOTs and Programming tools using built-in Ethernet port.
◎25 models from 10 k step small capacity to 1000 k step large capacity, are available.
◎Seamless communication and flexible integration at any network level.

Product Specifications

Program capacity	10k steps to 1000k steps
Number of I/O points [X/Y], number of I/O device points [X/Y]	256 points to 4096 points/8192 points
Basic instruction processing speed (LD instruction)	120ns to 1.9ns
External connection interface	USB (all models equipped), Ethernet, RS-232, memory card, extended SRAM cassette
Function module	I/O, analog, high-speed counter, positioning, simple motion, temperature input, temperature control, network module
Module extension style	Building block type
Network	Ethernet, CC-Link IE controller network, CC-Link IE field network, CC-Link, CC-Link/LT, MELSECNET/H, SSCNETⅢ (/H), AnyWire, RS-232, RS-422

HMI | Graphic Operation Terminal GOT2000 Series GT27 Model



To the top of HMIs with further user-friendly, satisfactory standard features.

◎Comfortable screen operation even if high-load processing (e.g. logging, device data transfer) is running. (Monitoring performance is twice faster than GT16)
◎Actual usable space without using a SD card is expanded to 128MB for more flexible screen design.
◎Multi-touch features, two-point press, and scroll operations for more user-friendliness.
◎Outline font and PNG images for clear, beautiful screen display.

Product Specifications

Screen size	12.1", 10.4", 8.4" (15" coming soon)
Resolution	SVGA, VGA (XGA coming soon)
Intensity adjustment	32-step adjustment
Touch panel type	Analog resistive film
Built-in interface	RS-232, RS-422/485, Ethernet, USB, SD card
Applicable software	GT Works3
Input power supply voltage	100 to 240VAC (+10%, −15%), 24VDC (+25%, −20%)

Inverter | FREQROL-A700 Series



High-function, high-performance inverter

◎High-accuracy, high-response speed control using real sensor-less vector control is possible with a general-purpose inverter having no PLG (encoder) (200% torque/0.3 Hz (3.7 K or less)).
◎Full-scale vector control is possible when used in combination with a motor with PLG (when using option).
◎The built-in noise filter (EMC filter) helps reduce noise generated from the inverter.
◎This series supports IPM motor operation. Use auto tuning to operate with the optimum motor characteristics.

Product Specifications

Inverter capacity	200V class: 0.4kW to 90kW, 400V class: 0.4kW to 500kW
Control method	IPM control, Soft-PWM control, high-carrier frequency PWM control (Select from V/F, advanced flux vector, or real sensor-less vector), vector control (when using options)
Output frequency range	0.2 to 400Hz (real sensor-less vector, upper frequency during vector control is 120Hz)
PM offline auto tuning	200V class: 0.4K to 1.5K (150%3%ED), 2.2K/3.7K (100%3%ED) When using the MM-CF Series, the motor constants, etc., are automatically measured for operation with the optimum motor characteristics (IPM motors other than the MM-CF Series, and other IPM motor brands are also supported)
Starting torque	200% 0.3Hz (3.7K or less), 150% 0.3Hz (5.5K or more) (when using real sensor-less vector, vector control)

AC Servo | Mitsubishi General-Purpose AC Servo MELSERVO-J4 Series



Industry-leading level of high performance servo

◎Industry-leading level of basic performance: Speed frequency response (2.5kHz), 4,000,000 (4,194,304p/rev) encoder
◎Advanced one-touch tuning function achieves the one-touch adjustment of advanced vibration suppression control Ⅱ, etc.
◎Equipped with large capacity drive recorder and machine diagnosis function for easy maintenance.
◎2-axis and 3-axis servo amplifiers are available for energy-conservative, space-saving, and low-cost machines.

Product Specifications

Power supply specifications	1-phase/3-phase 200V AC, 3-phase 400V AC
Command interface	SSCNET Ⅲ/H, SSCNET Ⅲ (compatible in J3 compatibility mode), CC-Link IE Field Network interface with Motion, pulse train, analog
Control mode	Position/Speed/Torque/Fully closed loop
Speed frequency response	2.5kHz
Tuning function	Advanced one-touch tuning, advanced vibration suppression control Ⅱ, robust filter, etc.
Safety function	STO, SS1 SS2, SOS, SLS, SBC, SSM (compatible when combined with motion controller)
Compatible servo motor	Rotary servo motor (rated output: 0.05 to 22kW), linear servo motor (continuous thrust 50 to 3000N), direct drive motor (rated torque: 2 to 240N•m)

EDM | Wire EDM MV1200R



Next-generation Innovations of our best selling Performance Machine.

◎Total running cost reduced up to 42%, which is accounted for 90% by filter, ion exchange resin and power consumption.
◎Improved productivity by an innovative automatic wire threading.
◎Faster machining is realized with improved power-supply performance.
(Rz3. 5μm/Ra0. 45μm with 3cuts) (Rz2. 0μm/Ra0. 28μm with 4cuts)

Product Specifications

Model	MV1200R
Machining travel (X×Y×Z)[mm] (in)	400(15.7)×300(11.8)×220(8.7)(XY axis OPT-drive specifications)
Machining travel (U×V)[mm] (in)	±60(2.4)×±60(2.4)(OPT-drive specifications)
Max. taper angle [°]	15° (maximum 200mm)(7.9")
Max. workpiece dimensions [mm] (in)	810(31.9)×700(27.6)×215(8.5)
Wire diameter [mm] (in)	0.1(.004) to 0.3(.012)※1
Dielectric fluid	Water
Footprint (W×D)[mm] (in)	2025(79.7)×2760(108.7)

※1：Φ0.2(0.08) DD guides and Φ1.5(0.06) jet nozzle are standard equipment.

Robot | MELFA F Series



High speed, high precision and high reliability industrial robot

◎Compact body and slim arm design, allowing operating area to be expanded and load capacity increased.
◎The fastest in its class using high performance motors and unique driver control technology.
◎Improved flexibility for robot layout design considerations.
◎Optimal motor control tuning set automatically based on operating position, posture, and load conditions.

Product Specifications

Degrees of freedom	Vertical:6 Horizontal:4
Installation	Vertical:Floor-mount, ceiling mount, wall mount (Range of motion for J1 is limited) Horizontal:Floor-mount
Maximum load capacity	Vertical:2-20kg Horizontal:3-20kg
Maximum reach radius	Vertical:504-1503mm Horizontal:350-1,000mm